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THE "ANOXEMIA TEST" AS AN INDEX OF THE CORONARY RESERVE

SERIAL OBSERVATIONS ON ONE HUNDRED AND THIRTY-SEVEN PATIENTS WITH THEIR APPLICATION TO THE DETECTION AND CLINICAL COURSE OF CORONARY INSUFFICIENCY

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The "anoxemia test," together with its clinical applications and limitations, has already been described in detail.[1] In principle it consists of permitting the patient to breathe a mixture of 10 per cent oxygen and 90 per cent nitrogen for twenty minutes or until cardiac pain appears. Measurements of electrocardiograms taken at intervals during this period reveal in patients with a diminished coronary reserve characteristic changes which are not observed in the presence of an adequate coronary blood flow. The occurrence of pain during the test has not been stressed as a diagnostic feature, because it represents a subjective reaction. In this respect, the present study appears to call for a modification in the point of view. The observations here reported were designed to furnish information concerning the value of a series of tests done over a period of time on the same patients, with particular reference to the diagnosis and the clinical course of coronary insufficiency.

MATERIAL AND METHOD

The group studied comprised 137 persons, on whom the test was performed 373 times. The duration of follow-up study ranged from six to thirty-nine months, with an average of twenty-one months. On 120 patients the test was done at least twice and on some as often as twenty times. The patients were classified according to the clinical diagnosis made before the initial test was carried out. In the control group were 25 "normal" persons, who did not have symptoms or signs of cardiac disease. Twenty-four patients were suspected of having coronary artery disease, chiefly because of the complaint of cardiac pain, although no signs of heart disease were found. Sixty-seven patients had coronary sclerosis. This diagnosis was established by the presence of cardiac enlargement, an abnormal electrocardiogram or both. Many, but not all, of the 67 complained of anginal pain. In 45 no infarction was believed to have occurred; in 22 healed infarcts were known to be present. Ten had hypertension with no clinical evidence of coronary involvement. Among 11 patients with miscellaneous conditions 5 had rheumatic heart disease, 3 syphilitic aortitis and aortic insufficiency, 2 severe anemia and 1 acute pericarditis, probably of rheumatic origin (table 1).

Twenty-three patients died during the follow-up period, 15 of heart disease. In 11 of the 15 death was "acute"; that is, it occurred either suddenly or within a few weeks after an attack of coronary occlusion; in 4 it was due to congestive heart failure. Eight patients died of causes other than cardiac disease.

There were 96 men and 41 women; 123 were white and 14 Negro. In age the patients ranged from 20 to 79 years. The control group included persons from 31 to 77. There was no patient with coronary sclerosis under 40.

The data in each case were transferred to forms designed for the purpose, and a detailed statistical analysis was then carried out.[2] Only selected aspects of this study are here presented.

The test was performed as previously described, the criteria of a positive reaction being as follows:[3]

1. The arithmetical sum of the RS-T deviations in all four leads (1, 2, 3 and 4 F) totals 3 mm. or more.

2. There is partial or complete reversal of the direction of the T wave in lead 1, accompanied by an RS-T deviation of 1 mm. or more in this lead.

3. There is complete reversal of the direction of the T wave in lead 4 F, regardless of RS-T deviation.

4. There is partial reversal of the direction of the T wave in lead 4 F, accompanied by an RS-T deviation of 1 mm. or more in this lead.

The test should not be performed in the presence of congestive heart failure, within four months after known cardiac infarction or on the same patient more than once in twenty-four hours. If these precautions are observed, serious reactions may be avoided.

RESULTS OF FOLLOW-UP STUDY

"Normal" Patients.—There were 25 in this group, all without symptoms or signs of cardiac disease. None showed a positive result or died of cardiac disease. During the course of observation 2 died of cancer and 1 of pulmonary tuberculosis.

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1. Levy, R. L.; Bruenn, H. G., and Russell, N. G., Jr.: The Use of Electrocardiographic Changes Caused by Induced Anoxemia as a Test for Coronary Insufficiency, Am. J. M. Sc. **197**: 241 (Feb.) 1939. Levy, Williams, Bruenn and Carr.[3]

2. Miss Dorothy Kurtz, Supervisor of the Record Department of the Presbyterian Hospital, aided in making the statistical analysis.

3. Levy, R. L.; Williams, N. E.; Bruenn, H. G., and Carr, H. A.: The "Anoxemia Test" in the Diagnosis of Coronary Insufficiency, Am. Heart J. **21**: 634 (May) 1941.

Patients with Suspected Coronary Sclerosis.—There were 24 in this group. A positive reaction was observed in 3; in 2 of these the reaction subsequently became negative. None had pulmonary edema or congestive heart failure. In 1 death from acute cardiac disease occurred. In 21 patients the reaction was negative; in 1 of these it became positive. None in the course of the study had coronary occlusion, pulmonary edema or congestive heart failure.

Patients with Coronary Sclerosis.—There were 67 in this group. The reaction was positive in 30; in 11 of these it later became negative. In 6 of the 11 in whom a negative reaction was later observed pain occurred during induced anoxemia. Coronary occlusion, pulmonary edema and congestive failure each were observed once during the follow-up period. Four patients died of acute cardiac disease; 5 died of causes other than heart disease. In 37 the reaction was negative; in 14 of these, pain occurred during the test. Of the 37, 10 later showed a positive reaction, and of these 10, pain had appeared in 4 when the reaction was negative. Coronary occlusion and congestive failure each occurred once. Three patients died of acute cardiac disease; 2 died of causes other than cardiac disease.

TABLE 1.—*Material*

Number of patients		137
Number of tests		272
Duration of follow-up study, 6 to 39 months (average, 21)		
Clinical diagnoses		
Person normal		25
Suspected coronary sclerosis		24
Coronary sclerosis		67
No known infarction	45	
Healed infarction	22	
Hypertension		10
Miscellaneous		11
Rheumatic heart disease	5	
Syphilitic aortic insufficiency	3	
Anemia	2	
Pericarditis	1	

Patients with Hypertension.—There were 10 in this group. The reaction was positive in only 1, in whom it remained so throughout the period of observation. This patient had no complications and survived. In 9 the reaction was negative. One of these later showed a positive reaction. One subsequently had congestive failure and survived. Four died of congestive failure.

Miscellaneous Patients.—There were 11 in this group. The reaction was positive in 2. One later showed a negative reaction, and pain occurred during the test. There were no later complications. Nine showed a negative reaction which in 1 later became positive. Two patients, both of whom had aortic insufficiency, died of acute cardiac disease; in both, although the reaction was negative, the test caused pain.

UNPLEASANT SYMPTOMS AND REACTIONS

On a number of occasions unpleasant symptoms occurred during the test but did not interfere with its completion. These were dizziness, headache, palpitation and irregular breathing. Unpleasant reactions which required termination of the test were observed eighteen times in 12 patients (table 2). Of these, vasovagal attacks were the most frequent and were observed eight times in 6 patients. In 3 patients on five occasions a state of panic developed. There was loss of consciousness twice in the same person, but curiously enough there was no change in either pulse rate or blood pressure. Consciousness returned in about one minute after 100 per cent oxygen was administered. Dyspnea was observed twice in 1 patient. Though the dyspnea was not severe, it was deemed wise to terminate the observation. Pulmonary edema occurred once during a test done in November 1938, when the work was in its early stages. This is one of three similar reactions already reported.[1] Since we have observed the simple precautions already outlined, there has been no repetition of this disturbance.

TABLE 2.—*Unpleasant Reactions Which Required Termination of Test*

Type of Reaction	Number of Times Observed	Number of Patients in Whom Reaction Occurred
Vasovagal attack	8	6
Panic	5	3
Loss of consciousness *	2	1
Dyspnea	2	1
Pulmonary edema †	1	1

* No change in pulse rate or blood pressure.
† Occurred in November 1938, during the early stage of the work.

It is our considered judgment that the test is safe for clinical use if properly performed. In the past four years it has been done in our laboratory 1,024 times on 442 persons. Unpleasant reactions have been observed forty-six times in 36 patients. There have been no serious effects; and repeated tests have not in any patient affected unfavorably the course of his disease.

SIGNIFICANCE OF A NEGATIVE REACTION WITH PAIN

In our previous studies importance was attached only to changes in the form of the electrocardiogram caused by induced anoxemia. This attitude was adopted because it was believed that pain, being a subjective reaction, might be an unreliable indicator. Patients vary in their susceptibility to painful stimuli, and in a few who are malingerers the result may be misleading. Certainly a method which is objective is preferable. In analyzing the present series, however, we were struck by the fact that in patients with coronary sclerosis who experienced pain during the test, even though no significant changes appeared in the electrocardiograms, the cardiac lesions were often progressive. Some of these patients later showed a positive reaction, and a relatively large number during the follow-up period either had serious complications or died (table 3). In 63.3 per cent of a group of 30 patients showing a positive reaction on the first examination the result remained positive during the follow-up period; 23.3 per cent later either had coronary occlusion, pulmonary edema or congestive failure or died of cardiac disease.

TABLE 3.—*Results of Test in Relation to Clinical Course in Sixty-Seven Patients with Coronary Sclerosis*

Result of First Test	Number of Cases	Result of Follow-Up Test Positive		Complications During Period of Observation *	Deaths	Complications + Deaths	
		Number	Percentage			Number	Percentage
Positive	30	19	66.3	3	4	7	23.3
Negative with pain	14	4	28.6	1	2	3	21.4
Positive + negative with pain	44	23	52.3	4	6	10	22.7
Negative, no pain	23	6	26.1	1 †	1 †	1	4.3

* The complications included are coronary occlusion, pulmonary edema and congestive failure.
† Same patient.

Of a group of 14 patients showing a negative reaction with pain 28.6 per cent later had a positive reaction and 21.4 per cent had complications or died of heart disease. When these two groups are combined, making a total of 44 patients with either a positive reaction or a negative reaction with pain, 52.3 per cent showed a positive reaction during the follow-up period and 22.7 per cent had complications or died.

In contrast to the foregoing figures are the results obtained on 23 patients who had a negative reaction without pain. Of these 26.1 per cent showed a positive reaction on follow-up study but only 1, or 4.3 per cent, suffered from coronary occlusion and later died.

The importance of a negative reaction with pain is brought out in another way when the type of cardiac death is related to the result of the test (table 4). Of the entire series of 137 patients, 15 died of heart disease. Death was acute in 11; of these, 54 per cent showed a positive reaction and 36 per cent a negative reaction with pain. If these two groups are combined, it appears that in 10 of the 11 patients (90.1 per cent) in whom acute cardiac death occurred the reaction either was positive or was negative with pain. In contrast to these observations are the results in 4 patients

TABLE 4.—*Type of Cardiac Death in Relation to Result of Test in Fifteen Cases*

Death		Result of Test					
		Positive		Negative with Pain		Positive + Negative with Pain	
Type	Number	Number	Percentage	Number	Percentage	Number	Percentage
Acute cardiac	11	6	54	4	36	10	90.1
Congestive failure	4	0	0	0	0	0	0

who died of congestive failure. None of them showed a positive reaction or a negative reaction with pain. Thus a positive reaction or a negative one with pain indicates that there is a 90 per cent chance, in case of death, that the end will come suddenly or within a short time after an attack of cardiac infarction. If the reaction is negative, death, when it occurs, is apt to be associated with congestive heart failure.

The reasons for the occasional dissociation of pain and electrocardiographic changes during anoxemia are not clear. How painful impulses are initiated in the heart is imperfectly understood. When there is an oxygen want, many adaptive mechanisms are brought into play.[4] Among these are variations in the cardiac output, the size of the heart, the heart rate, the arterial and venous pressures, the depth of pulmonary ventilation and the caliber of the coronary vessels. The manner in which these factors react on one another at different levels of anoxia and under varying clinical conditions undoubtedly plays a part in determining the effectiveness of the coronary blood flow. With the number of variables concerned it is not surprising that the result should be inconstant.

COMMENT

The use of the anoxemia test in differential diagnosis has already been indicated.[1] The following case is illustrative.[5]

CASE 1.—H. P., a man aged 61, a salesman, was admitted to the hospital on Dec. 29, 1939, with cough, dyspnea on exertion and "heaviness in the left side of the chest" of three weeks' duration. He had previously been in excellent health. He consulted his local physician, who found nothing abnormal on physical examination. A roentgenogram of the chest was said to show a metastatic growth in the mediastinum. He was referred to the hospital for complete study.

Examination revealed no cardiac enlargement. A souffle was heard above the left clavicle. The heart sounds were normal. The blood pressure in the right arm ranged from 150 to 170 systolic and from 85 to 100 diastolic; in the left arm it was 120 to 130 systolic and 90 diastolic. The first impression was that the patient had either carcinoma of the bronchus or an aneurysm of the aorta, probably the former.

The electrocardiogram showed low T waves and slight depression of the RS-T segments in the three standard leads. Roentgenograms of the chest showed a little dilatation of the ascending and the descending portions of the aorta. There were numerous dense streaky shadows radiating from the upper portion of the hilus of the right lung into the upper lobe on the right side. The appearance of these shadows suggested peribronchial fibrosis and scarring as the result of a tuberculous lesion. There were no changes suggesting a neoplasm. The heart was not enlarged.

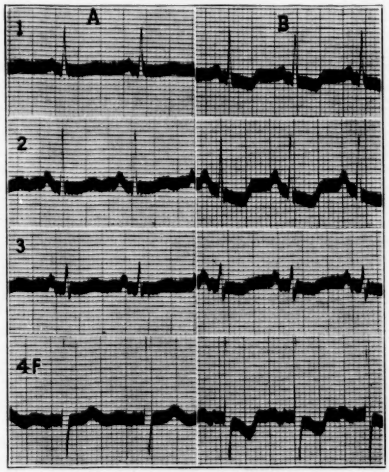

Fig. 1.—Result of the anoxemia test on H. P. (case 1). There had been cough, dyspnea and "heaviness in the chest" on effort for three weeks. Carcinoma of the lung or aortic aneurysm was at first suspected. The anoxemia test established the diagnosis of coronary sclerosis. *a*, control; *b*, after the patient had breathed 10 per cent oxygen for twenty minutes. There was no pain.

The anoxemia test gave a positive result (fig. 1). There was a total RS-T deviation of 4 mm., and the T waves became inverted in leads 1 and 4 F. A diagnosis of coronary sclerosis was made.

In June 1940 the patient reported that he was having only occasional precordial oppression, relieved by the use of glyceryl trinitrate. An electrocardiogram was similar to the one previously made, and a roentgenogram of the chest likewise showed no change. The last follow-up examination was in November 1940. He was drinking rather heavily but did not complain of cardiac discomfort. An electrocardiogram taken at this time showed the T waves in leads 1 and 2 to be of even lower amplitude than before. In April 1941 word was received that he was in an institution because of chronic alcoholism.

Recently confirmation of the value of the test in diagnosis appeared in the paper of Evans and Bourne.[6]

4. Wiggers, C. J.: Cardiac Adaptations in Acute Progressive Anoxia. Ann. Int. Med. **14**: 1237 (Jan.) 1941.
5. This case was studied by permission of Dr. Robert F. Loeb.
6. Evans, Courtenay, and Bourne, Geoffrey: Electrocardiographic Changes After Anoxemia and Exercise in Angina of Effort, Brit. Heart J. **3**: 69 (Jan.) 1941.

They administered a 10 per cent oxygen mixture for three to five minutes and found that of 20 patients with angina of effort in whom the four lead control electrocardiogram showed no significant change 6 gave abnormal ST and T wave responses. The period of anoxemia employed by these investigators was relatively short. It is not surprising, therefore, that in their experience an exercise test produced an abnormal response a little more often than did the anoxemia test; but occasionally they noted changes in the electrocardiogram after anoxemia when no such changes followed exercise.

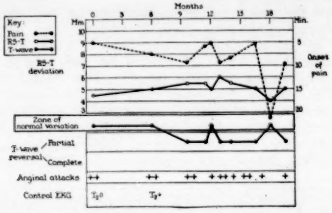

Fig. 2.—Correlation of anoxemia tests of J. F. (case 2) with clinical course. He had attacks of cardiac pain for nine years, during which the diagnosis at various times was neuritis of the ulnar nerve, hyperthyroidism and cardiac neurosis. There was slight clinical improvement during the period of observation; the coronary reserve was variable but always reduced. In this and subsequent graphs the "zone of normal variation" covers the range of change caused by anoxemia in the electrocardiograms of normal persons. "Pain" refers to discomfort experienced during the test, and the time of its onset is charted. The "RS-T deviation" represents the sum of this measurement in all four leads. "T wave reversal" refers to this change in lead 1, lead 4F or both.

Through additional experience we have found no reason to change our criteria for a positive reaction. However, some significance, it appears, must now be attached also to a test which gives electrocardiographically negative results but during which pain appears. This is particularly true if the pain occurs during the first ten minutes of induced anoxemia. Four patients with negative reactions and such an early appearance of pain died within three years.

In reporting the results we have already directed attention to the relatively high incidence of complications and deaths among patients with coronary sclerosis who have shown a positive reaction or a negative reaction with pain, in contrast to the low incidence among patients with a negative reaction without pain. Similar evidence indicating the importance of a negative reaction with pain has been presented in the analysis of acute cardiac deaths as compared with deaths due to congestive failure. For the present, therefore, we are inclined to regard a negative reaction with pain as presumptive evidence of coronary insufficiency. The patients in whom this type of response is observed should be followed for further signs of coronary artery disease, and their management should be conservative.

The variable clinical course of persons suffering from coronary sclerosis is common knowledge. Anginal pain in particular tends to vary in severity and frequency. Changes in the form of the electrocardiogram may be observed at times without corresponding variation in symptoms.[7] That either progressive damage or repair can take place in the heart insidiously, because of anatomic changes, has been demonstrated clearly by Blumgart and his co-workers,[8] who studied the coronary bed in diseased human hearts injected post mortem. They concluded that coronary occlusion if gradual and accompanied by the development of anastomotic circulation does not necessarily produce characteristic clinical manifestations. Variations in the coronary reserve can, however, be demonstrated in patients with this type of occlusion by changes in the response to induced anoxemia. The following cases serve to illustrate this point.

CASE 2.—J. F., a man aged 44, a taxi driver, in 1931 (nine years before his first visit to the hospital) began to notice pain in the left arm on walking. He was seen in the neurologic clinic and was given physical therapy for what was believed to be neuritis of the left ulnar nerve.

In 1935 he was first seen in the medical clinic because the pain in the left arm was worse and after exertion radiated to the left side of the chest. An electrocardiogram showed slight prolongation of auriculoventricular conduction. The PR interval measured 0.21 second. The Kline reaction of the blood was negative. The blood cell count was normal. Thyrotoxicosis was suspected, and partial thyroidectomy was recommended, although the basal metabolic rate was only + 8 per cent. The operation, however, was not done.

By 1938 the pain had increased in severity and frequency. It occurred when the patient walked for three blocks. He described one episode of more severe discomfort which occurred while he was at rest. An electrocardiogram made on Nov. 30, 1938 showed inversion of the T wave in leads 2 and 3, together with a large Q_3. Posterior infarction was suspected, although the patient's physician regarded a cardiac neurosis as the most likely diagnosis and recommended reassurance. An anoxemia test done three weeks after the episode of more severe pain gave positive results (fig. 2). The patient experienced discomfort similar to his spontaneous attacks at the end of four minutes. The total RS-T deviation was 4.5 mm. There were no changes in the T wave. The diagnosis of coronary sclerosis was now established.

During the next twenty months he was seen at frequent intervals and numerous anoxemia tests were done. These all gave a positive result. He was last seen in April 1940. He was still having precordial pain radiating to the epigastrium. He was able to drive his taxi and rarely required glyceryl trinitrate for relief.

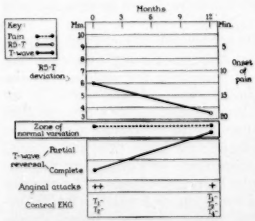

Fig. 3.—Correlation for M. D. (case 3). Cardiac infarction occurred thirteen months before the first test. The clinical condition improved during the period of observation. The result of the anoxemia test, at first positive, became almost negative twenty-five months after the attack. Changes in the control electrocardiogram, however, increased.

That the healing of a cardiac infarct and the development of collateral circulation can be demonstrated by serial tests has been previously pointed out.[1] The following case indicates clearly that improvement in the state of the coronary circulation may take place during the second year following coronary occlusion.

CASE 3.—M. D., a man aged 60, a gardener, was admitted to the hospital on Feb. 7, 1939 with severe precordial pain of two days' duration. He had had occasional substernal pressure on exertion for six months. The more recent, severe pain persisted up to the time of his admission to the ward.

7. Levy, R. L.; Bruenn, H. G., and Williams, N. E.: The Modifying Action of Certain Drugs (Aminophyllin, Nitrites, Digitalis) on the Effects of Induced Anoxemia in Patients with Coronary Insufficiency, Am. Heart J. **19**: 639 (June) 1940. Gold, Harry; Kwit, N. T., and Cattell, McK.: Studies on Purified Digitalis Glucosides: I. Potency and Dosage of "Digitaline Nativelle" by Oral Administration in Man, J. Pharmacol. & Exper. Therap. **69**: 177 (July) 1940.

8. Blumgart, H. L.; Schlesinger, M. J., and Davis, David: Studies on the Relation of the Clinical Manifestations of Angina Pectoris, Coronary Thrombosis and Myocardial Infarction to the Pathologic Findings, Am. Heart J. **19**: 1 (Jan.) 1940.

Examination revealed a moderately enlarged heart, distant heart sounds and a systolic blow at the apex. The erythrocyte sedimentation rate was 40 mm. in one hour. The Kline reaction of the blood was negative. An electrocardiogram showed inversion of the T wave in leads 1 and 2 and depression of the RS-T segments in these leads. A roentgenogram of the heart showed left ventricular enlargement and prominence of the aortic knob. The diagnosis was coronary occlusion with infarction of the myocardium. The patient was in the hospital for eleven weeks and was discharged with a regimen of limited activity.

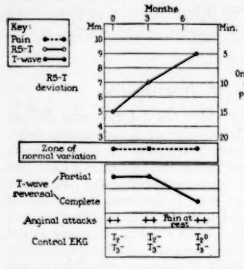

Fig. 4.—Correlation for H. L. (case 4). Cardiac infarction occurred twelve months prior to the first test. The clinical condition was unchanged during the period of observation; the coronary reserve diminished progressively. Death (suicide) occurred one month after the last test.

During the next year he had moderate precordial pain on exertion which increased in severity toward the end of this period. An electrocardiogram made on Feb. 7, 1940 showed the T wave to be diphasic in leads 1 and 2 and the RS-T segment depressed in leads 1 and 2 and elevated in lead 3. During an anoxemia test on March 5, thirteen months after infarction, there was no pain but a total RS-T deviation of 6 mm. and inversion of the T wave in leads 1 and 4 F (fig. 3) were noted.

During the second year after the occurrence of infarction the precordial discomfort decreased. The patient had scarcely any pain except after severe effort, such as carrying a bucket up a flight of stairs. He rarely required glyceryl trinitrate for relief. He had been shoveling coal. The blood pressure was 155 systolic and 78 diastolic. An electrocardiogram now showed inversion of the T wave in lead 4 F. An anoxemia test done twenty-five months after infarction gave a positive result, but the electrocardiographic changes were minimal. There was no pain. The total RS-T deviation was 3.5 mm., and there was no reversal in the direction of the T wave. The size of the heart was unchanged.

The results of the test cannot be regarded as a quantitative expression of the degree of coronary insufficiency. On the other hand, in a given patient a trend, when present, paralleled the clinical course. In other words, if the reaction improved the patient reported that his discomfort, particularly pain, was less frequent and less intense; if the reaction showed greater deviations from normal the clinical condition was aggravated. This is illustrated in the following 2 cases, with their accompanying graphs.

CASE 4.—H. L., a man aged 40, an elevator starter, was admitted to the hospital Feb. 9, 1939 with precordial pain radiating to the left arm. He had had coronary occlusion in April 1938 (eleven months previously). He had been a heavy smoker. The heart was not enlarged. The first sound was diminished in intensity. The blood pressure was 128 systolic and 80 diastolic. The electrocardiogram showed inversion of the T wave in leads 2 and 3 and a large Q wave in lead 3. A teleroentgenogram of the heart showed no enlargement.

He was followed in the outpatient department during the next seven months. According to his reports there was little change in his symptoms. During this period three anoxemia tests were done, all of which gave positive results (figs. 4 and 5). The changes observed became progressively more marked. He committed suicide about one year after his first visit to the clinic. A postmortem examination was not done.

CASE 5.—C. A., a man aged 51, a railroad conductor, was first seen in November 1939, when he stated that he had had attacks of precordial pain for one year. Discomfort radiated to both shoulders and arms. It was related to exertion and was relieved by the taking of glyceryl trinitrate. He was having three to five attacks a day. On examination there was no cardiac enlargement and the heart sounds were normal. The blood pressure was 150 systolic and 90 diastolic and during subsequent observations was never above 135 systolic and 80 diastolic.

During the following two years he was seen at infrequent intervals and the attacks of pain decreased in severity and frequency. In April 1941, he reported that they occurred only on the most severe exertion. The anoxemia test, which was repeated four times during a year, gave negative results at the end of nine months (fig. 6).

Four patients in the present series who died came to necropsy. The observations on 2 of these have already been reported.[8]

The third was a white man aged 63 who complained of epigastric pain. Roentgenologic examination of the stomach revealed a duodenal ulcer. He was included in the group of normal persons. An anoxemia test done twenty-four months before death gave negative results, and he did not experience pain while breathing the low oxygen mixture. He died in another hospital of carcinoma of the stomach. No pathologic change in the heart was noted at necropsy.

The fourth patient was a white man aged 39 who for five months had had epigastric and precordial pain induced by effort or excitement. Physical examination gave negative results. The blood pressure was 112 systolic and 78 diastolic. The electrocardiogram showed prolonged auriculoventricular con-

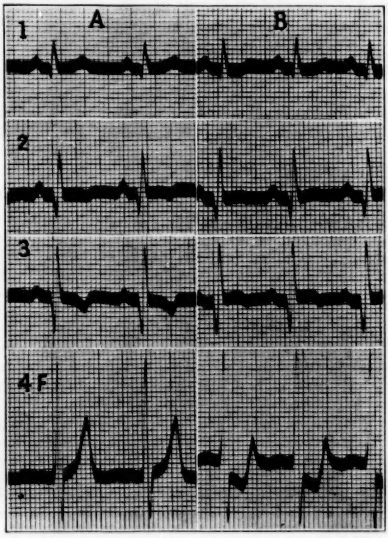

Fig. 5.—Result of the anoxemia test on H. L. (case 4). *a*, control; *b*, after the patient had breathed 10 per cent oxygen for twenty minutes. There was no pain.

duction, which at times reached 0.26 second. He was in the hospital for three weeks and was discharged with a diagnosis of chronic rheumatic heart disease. During the following year his symptoms increased and he was again admitted to the ward because of a severe attack of precordial pain which lasted one hour. The heart at this time was enlarged, the sounds were weak and a systolic murmur was heard at the apex. The blood pressure was 100 systolic and 68 diastolic. The tempera-

ture was normal and the leukocyte count was 8,600 per cubic millimeter, with 63 per cent polymorphonuclear cells. He died suddenly eight hours after admission. The final clinical diagnosis was coronary sclerosis and myocardial infarction.

Anoxemia tests were done nineteen, eighteen, fifteen and two months before death. During the first test the patient complained of precordial pain at the end of six minutes; but in none of the tests were significant electrocardiographic changes observed. At necropsy, there were advanced sclerosis of the coronary arteries, with occlusion of the right and circumflex branches of the left coronary artery, and old and recent infarcts of the myocardium, involving the left ventricle and the interventricular septum. There were no lesions of rheumatic fever. The changes in the heart were interpreted as indicating no significant diminution in the coronary reserve, in spite of the extensive disease.

It is not possible on the basis of the result of the test to predict the future occurrence of coronary occlusion. Several patients have suffered such attacks within a few months of the time that a negative reaction was noted. On the other hand, as has already been pointed out, patients with a positive reaction or with a negative reaction with pain are more likely to have this complication than those with a negative reaction. In short, the anoxemia test furnishes information concerning the coronary reserve only at the time of its performance. It is an index within undefined limits of the functional efficiency of the coronary circulation and yields no information as to the nature or extent of pathologic lesions in the heart.

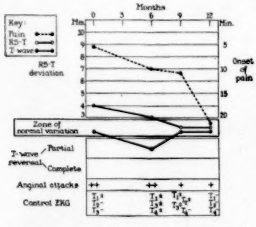

Fig. 6.—Correlation for C. A. (case 5). There had been attacks of anginal pain for one month; clinical improvement was noted during the subsequent thirteen months. The result of the anoxemia test became negative, although control electrocardiograms showed increasing changes.

SUMMARY

1. This study is based on 373 anoxemia tests performed on 137 persons during the past thirty-nine months. On all but 17 patients the test was done at least twice; on some it was done as often as twenty times.

2. A positive reaction was not observed in any patient without cardiac disease or severe anemia.

3. A positive reaction may be regarded as a sign of coronary insufficiency; a negative reaction does not exclude disease of the coronary arteries.

4. The occurrence of pain during a test with a negative result, particularly if it appears during the first ten minutes of induced anoxemia, affords presumptive evidence of a diminished coronary reserve. Under these circumstances the patient should be carefully observed for further signs of coronary disease and managed conservatively.

5. The test is simple and safe. In the past four years it has been done 1,024 times on 442 persons. Unpleasant reactions have been observed forty-six times in 36 patients. But there have been no serious effects, and the course of the disease has not been affected unfavorably as the result of repeated tests.

6. The test is helpful in the differential diagnosis of conditions producing pain in the chest. When the reaction is positive it serves to distinguish discomfort due to coronary insufficiency from that caused by other disorders. It is useful in following variations in the coronary reserve and so in appraising the efficiency of the coronary circulation at the time of its performance. Serial observations reflect in a general way the trend of the clinical course. The test does not furnish evidence which makes it possible to predict the future occurrence of coronary occlusion. It affords an index within undefined limits of the adequacy of the coronary blood flow, but it yields no information as to the nature or extent of the pathologic lesions in the heart.

730 Park Avenue.

ABSTRACT OF DISCUSSION

DR. ROY W. SCOTT, Cleveland: One of the most difficult diagnostic problems which the practitioner is occasionally called on to solve concerns the coronary arteries. In the absence of clear objective evidence of cardiovascular disease are the patient's symptoms those of coronary insufficiency? A person with coronary artery disease may be in imminent danger of death, and yet a most careful and complete examination may reveal no objective evidence of heart disease. Puzzling indeed is the individual primarily interested in establishing a claim for total disability on the basis of coronary insufficiency and angina pectoris. In the light of our present conceptions which regard Heberden's angina pectoris as a manifestation of myocardial ischemia, any safe procedure which loads the coronary circulation and which at the same time gives some objective index of the response would be a valuable test in the study of the occasional difficult case of coronary insufficiency. Such a test appears to be the "anoxemia test" as previously described by Dr. Levy and his associates, and further observations with it we have heard this morning. It seems fair to conclude that at least in Dr. Levy's hands the test has been safe and, when positive, has aided materially in differentiating coronary insufficiency from other disorders which cause chest pain. On the other hand, we must keep in mind that the induction of generalized anoxemia from the inhalation of low percentages of oxygen for fifteen or twenty minutes must be undertaken with great care; that the safety zone is narrow when one is dealing with atmospheres around 10 per cent oxygen, which correspond to an altitude of about 18,000 feet above sea level. Unless one is adequately equipped as is Dr. Levy and thoroughly aware of the dangers of generalized anoxemia particularly to the nervous system, one is not justified, I believe, in using the procedure. A disconcerting note regarding the practical use of the test in the diagnosis of coronary insufficiency was sounded by Dr. C. T. Burnett of Denver in a paper presented before the American Heart Association. He reported unpleasant and at times somewhat alarming reactions, as well as positive electrocardiographic findings in a number of persons with no signs or symptoms of coronary disease. He concluded that the anoxemia test was dangerous and of only limited value in the diagnosis of coronary artery disease. These conclusions from what appear to have been carefully controlled experiments should not go unchallenged.

DR. ARLIE R. BARNES, Rochester, Minn.: As I see the situation, the advisability of recommending this test in clinical practice hinges on three questions. First, is the test safe? Dr. Levy assures us that it is, and in his hands no serious results have followed its use; but he reports that unpleasant reactions were observed 46 times in 36 cases. These reactions frequently consisted of symptoms indicating irritation of the central nervous system. We know that nerve cells are the most sensitive of all tissues to anoxia. This suggests that the possible harmful effects of the test must be assessed as much on symptoms indicating effects on the central nervous system as on those referable to the heart itself. Second, may we accept without question the criteria of abnormal electrocardiographic changes defined by Dr. Levy under the conditions of his experiment? I am certain that Dr. Levy realized these may have to be modified and would welcome a test of their validity by other observers working under the same conditions. Unfortunately, the test cannot be appraised by reference to pathologic findings in the heart, for the test may give negative results, as Dr. Levy

has shown, when the heart is the site of maximal pathologic changes, and positive results when such changes are moderate or minimal. This is another way of saying that functional insufficiency of the coronary circulation can be estimated inadequately from pathologic changes observed in the heart at necropsy. Third, how frequently is the test indicated when a competent internist is unable to arrive at a diagnosis on ordinary clinical grounds? Dr. Levy's published account indicated that even in the presence of clinical evidence of coronary sclerosis the yield of positive electrocardiographic changes varies from 20 to 69 per cent. A negative test does not permit the exclusion of insufficiency of the coronary circulation, as has been pointed out by Dr. Levy and his associates. In the 40 per cent or more cases in which negative results from the anoxemia test are obtained, the clinician is still forced to rely on his clinical judgment in arriving at a diagnosis. For these cases a careful analytic history and tests of the patient's reaction to conditions increasing cardiac work will remain almost the sole basis for the diagnosis of inadequate coronary circulation. This is an important and refreshing approach to this subject. It is to be hoped that competent observers, adhering to the precautions stressed by Dr. Levy, will carry out similar investigations.

DR. C. T. BURNETT, Denver: I think Dr. Scott said he concluded, from my remarks the other day, that I felt the test was of no value. I wouldn't want to go that far. I would say that at present it is not of dependable clinical value. I am not yet convinced that the criteria may not be modified so that, even in this small 5 per cent which Dr. Scott and Dr. Barnes have spoken of, it may be of some value. I became interested in this work about two years ago. My associates and I began a study of 125 persons, in different age groups, as entirely normal as we could determine. If, in the course of the test, these persons had pain, any of these unpleasant manifestations which Dr. Levy mentioned, or anything else which raised any question as to their normality, they were cast out. In addition to these there were 62 cases, which made a total of 189 cases studied. The 62 represented those eliminated from the normal series. In this work we came reluctantly to two complete reversals of opinion, for at the outset we felt the test was dependable. We don't find any significant difference in the response of men from 50 to 60 years to that of men 20 to 30. We duplicated in every respect Dr. Levy's technic. Using this technic and the same apparatus, we found—in the majority of these normal subjects—a usual normal response, identical with that obtained by Dr. Levy and his associates. But in a significant percentage (19.2) of this group we encountered an abnormal response, according to Dr. Levy's criteria. The majority of these showed T_4 inverted (Levy's third criterion). There wasn't any great difference in the age groups. We encountered vasovagal reactions, in all instances unpredictable. We encountered two convulsions. One occurred within thirty seconds after the man had responded to a question, when he had seemed to be perfectly conscious. I can't feel that a test which induces such a profound change as to lead that individual into a generalized convulsion is safe. We had no acute pulmonary edema but all the other unpleasant manifestations, I think, that Dr. Levy noted. The question has been raised as to the difference in response between Denver and New York. We used exactly the same percentage of oxygen as did Dr. Levy and—theoretically—we were subjecting our individuals to a little greater strain than in New York. Haden showed that at sea level the blood volume, hemoglobin, red cells and mean corpuscular volume are significantly lower than in Denver, as compared to studies by Mugrage and Andresen. So we feel that with persons who have lived in Denver there is sufficient compensation to make up for this difference.

DR. ROBERT L. LEVY, New York: In our experience, particularly in the hospital, the test has been of practical use in considerably more than 5 per cent of cases in which pain was referred to the chest. It has been helpful, for example, in differentiating discomfort due to gallbladder disease from that due to coronary sclerosis. Dr. Scott has referred to the use of the test as an aid in the determination of disability for insurance purposes. A negative test is without significance; a positive result indicates coronary insufficiency, though it does not measure the degree. In our hands the procedure has been safe, provided the simple precautions outlined were observed. We are familiar with the effects of anoxemia on the nervous system mentioned by Dr. Barnes. But what happens to guinea pigs in an airplane at an altitude of 18,000 feet is hardly comparable to the effects in human beings, who at sea level breathe 10 per cent oxygen for twenty minutes and whose lungs are then promptly flushed out with 100 per cent oxygen. The fact remains that, in the course of three years, there has been no evidence of injury to the nervous system in our patients. The criteria of a positive test, of course, may have to be modified. We have already modified them once ourselves. The dissociation of pathologic and physiologic findings should be stressed. This test is not an indicator of anatomic changes in the heart. It is intended to afford a rough index of the efficiency of the coronary blood flow within limits which, as yet, are undefined. The studies of Dr. Burnett are not strictly comparable to ours. He has worked at an altitude of 5,000 feet and his subjects, therefore, have experienced atmospheric conditions at 23,000 rather than at 18,000 feet. This difference undoubtedly accounts for some of the discrepancies in the results. The inhabitants of Denver probably are not quite as well acclimatized as he has implied.

CARCINOMA OF THE JEJUNUM AND OF THE ILEUM

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Carcinoma of the small bowel is often considered extremely rare. Though it is not common it is more frequent than is usually supposed. Sarcoma, however, is found more often in the lower part of the ileum than in the large bowel. Cancer of the ampulla of Vater and its adjoining tissue increases the incidence of carcinoma of the duodenum.

Three types of carcinoma of the jejunum and of the ileum may be considered: (1) the most common, adenocarcinoma; (2) carcinoid, or argentaffin tumor, and (3) melanocarcinoma.

The paper by Rankin and Mayo [1] in 1930, a later paper by Rankin and Newell [2] in 1933 and Raiford's [3] articles on tumors of the small intestine in 1931 and 1932 were thorough and interesting. They included reports on tumors of the small bowel occurring almost to the time of publication of the reports. Few cases have been added to the literature within the period which these papers cover. At the Mayo Clinic between Jan. 1, 1919 and Oct. 1, 1929 Rankin and Mayo [1] found 31 cases of carcinoma of the small bowel as compared with 2,775 cases of cancer of the large bowel and the rectum and 2,646 cases of cancer of the stomach. Hoffman and Pack [4] reported that of 228 cases of cancer of the small intestine the cancer was in the duodenum in 45.6 per cent.

In a study of the literature from the time of Raiford's article in 1932 to Jan. 1, 1941 I have found 384 cases of carcinoma and carcinoid of the jejunum and of the ileum. Of these cases, in 236 the tumor was adenocarcinoma of the jejunum or of the ileum, in 7 adenocarcinoma of Meckel's diverticulum, in 138 carcinoid

From the Surgical Department of St. Elizabeth's Hospital.

Read before the Section on Pathology and Physiology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 5, 1941.

1. Rankin, F. W., and Mayo, C. W.: Carcinoma of the Small Bowel, Surg., Gynec. & Obst. **50**: 939 (June) 1930.

2. Rankin, F. W., and Newell, C. E.: Benign Tumors of the Small Intestine: Report of Twenty-Four Cases, Surg., Gynec. & Obst. **57**: 503 (Oct.) 1933.

3. Raiford, T. S.: Tumors of the Small Intestine: Their Diagnosis, with Special Reference to X-Ray Appearance, Radiology **16**: 253 (Feb.) 1931; Tumors of the Small Intestine, Arch. Surg. **25**: 122 (July) 321 (Aug.) 1932.

4. Hoffman, W. J., and Pack, G. T.: Cancer of the Duodenum: Clinical and Roentgenographic Studies, Arch. Surg. **35**: 11 (July) 1937.

of the jejunum or of the ileum and in 3 carcinoid of Meckel's diverticulum. There have been 2 cases of what appears to be primary chorioepithelioma of the small intestine.

MELANOCARCINOMA

Primary melanocarcinoma in the jejunum or the ileum is rare, though a few cases have been reported.

Fig. 1.—External view of specimen from case 1. The proximal end is greatly dilated. The obstruction from the tumor is almost complete. There was severe kinking.

There have also been instances of what appears to be metastatic melanocarcinoma of the jejunum or the ileum from primary lesions of the skin. The surviving malignant cells seem to filter through the lungs and grow in the favorable tissue of the submucosa of the ileum.[5]

CARCINOID

Carcinoids, or argentaffin tumors, are interesting and unusual. They spring from argentaffin cells, which are distributed throughout the intestinal tract in man and many of the higher vertebrates. These tumors and cells are more common in the appendix, the cecum and the terminal part of the ileum. Most carcinoids are benign, but some are malignant and metastasize into the mesentery, the liver and even the brain.

A carcinoid of the intestine rarely surrounds the whole lumen and does not ulcerate. Consequently there is no blood in the feces and there are no toxic symptoms. Even the malignant type grows slowly, and resection of the bowel for an extensive carcinoid is justified even if there are metastases in the liver.

Carcinoid is apparently much more common than is usually believed. Keasbey [5] has often observed it during necropsy in elderly patients, particularly men, who have died from other causes.

5. Horsley, J. S., and Keasbey, Louisa E.: Tumors of the Small Intestine, in Lewis, Dean: Practice of Surgery, Hagerstown, Md., W. F. Prior Company, Inc., 1939, vol. 6, chap. 17.

Grossly an argentaffin tumor on section presents a rather distinctive yellowish color. Histologically the cells of benign and of malignant carcinoids are practically identical.

ADENOCARCINOMA

Adenocarcinoma of the small bowel may be ulcerative, stenosing or polypoid (fungous). Usually the stenosing type is also ulcerative to some extent. Histologically the tumors are classed as simple adenocarcinoma, medullary carcinoma, scirrhous carcinoma and colloid carcinoma. Adenocarcinoma is by far the most common type. The medullary and scirrhous types are rare. Adenocarcinoma has a tendency toward retaining the original acinous formation. The cells arising from the mucous membrane infiltrate the wall of the bowel and break down into ulceration. Occasionally the differentiation of cells and the formation of acini is so nearly complete that the histologic diagnosis of carcinoma is made chiefly by the infiltration of the growth and by the number of mitotic figures and the appearance of the individual cells. They may, however, become more active and invade in sheets. Metastasis to the lymph nodes occurs early. Colloid carcinoma of the small intestine is similar to colloid carcinoma of the stomach or the colon.

The fungous, or polypoid, type may arise from an adenoma. It usually protrudes into the bowel and often produces obstruction either from direct mechanical occlusion or from intussusception. Intussusception occurs with the stenosing or napkin ring type, but it is infrequent compared with intussusception from polypoid or fungous carcinoma.

Fig. 2.—Section of the tumor in case 1, a colloid adenocarcinoma. There is a considerable amount of colloid material along with some adenomatous tissues. Slightly reduced from a photomicrograph with a magnification of 200 diameters.

The early symptoms of carcinoma of the small intestine do not differ materially from the symptoms of

incomplete obstruction. Martin[6] has called attention to chronic incomplete obstruction of the small intestine. The symptoms often are vague and indefinite. The modern technic of roentgenologic study of the small bowel aids greatly in the diagnosis, but it must be followed through carefully over a period often of twelve or more hours. The main point is to determine delayed emptying. Many conditions, such as avitaminosis, sprue, pellagra and hypoproteinemia, may cause this delay, but partial mechanical obstruction should always be considered.

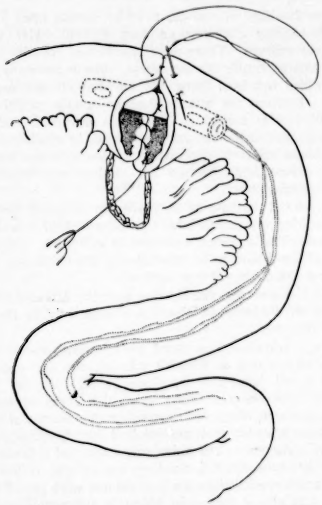

Fig. 3.—Technic of end to end intestinal anastomosis. The rubber tube with additional perforations has been fastened to the posterior margin of the union with a single suture of silk. In order to facilitate its expulsion, long threads of silk or cotton may be fastened in the distal end. The presence of the tube provides against immediate obstruction from swelling and renders safer the insertion of additional suturing to turn in more of the bowel.

The clinical symptoms in the earlier stages may be gaseous distention, heart burn, reflex pylorospasm and periods of diarrhea often alternating with periods of constipation. A lesion in the ileum when not completely obstructive frequently causes irritation, with consequent diarrhea. According to Martin,[6] patients with partial obstruction may complain of a certain awareness of their intestinal motility and fatigue which occurs before meals and suggests the possibility of hypoglycemia. Such patients are frequently classed as neurotic. They often speak of discomfort rather than pain, and this discomfort may be accentuated by the ingestion of meals. Martin stated that sometimes it appears before the evening meal or may awaken the patient at night. Dizziness, he said, is another symptom experienced by many patients. The dizziness may be intense and may not be due to any apparent cause. Unexplained and unpredictable mild waves of nausea occur. The duration of symptoms varies from a few months to many years. Incomplete obstruction seems to occur with about equal frequency in the two sexes.

6. Martin, Lay: A Discussion of Some Conditions Producing Chronic Low-Grade Obstruction of the Small Intestine, Mississippi Doctor **18**: 308 (Nov.) 1940.

When obstruction becomes complete it assumes the usual features of complete obstruction from any mechanical cause. It may occur from a particle of food lodging in the constricting napkin ring type of cancer. Occasionally the particle is dislodged, and the patient is temporarily relieved. The use of the Miller-Abbott tube combined with roentgen examination is often helpful in making a diagnosis.

Adenocarcinoma of the jejunum or of the ileum is more common in the upper part of the jejunum, near the ligament of Treitz. When the tumor is situated there, vomiting, particularly of large quantities of material, is a prominent symptom, even when the obstruction is not complete. If the tumor is in the lower part of the jejunum or in the ileum occasionally a movable mass may be felt, and when the mass slips from beneath the examining fingers readily it is suggestive of a tumor of the small intestine (Rankin). Occasionally there may be tarry stools, but occult blood is present in almost all cases of adenocarcinoma.

With ulcerating carcinoma of the jejunum or the ileum there is usually anemia, partly from the loss of blood and partly from the toxic products of the ulceration. With intussusception the pain is sharp and agonizing, and shock often develops soon. If the patient is thin there is visible peristalsis or counterperistalsis after any obstruction. If the tumor is high in the jejunum distention may be absent, but if it is low in the jejunum or in the ileum abdominal distention is severe.

The prognosis for malignant diseases of the small intestine is poor, probably largely on account of the difficulty of diagnosis and the lack of obvious symptoms until the condition is well advanced.

REPORT OF CASES

CASE 1.—H. K. W., a white man aged 59, admitted to the hospital April 11, 1939, had been in fairly good health until six months before admission, when he had mild indigestion, feeling as though his food would not leave his stomach properly. This gradually grew worse, and in the last three weeks nausea and vomiting had been severe. The indigestion usually appeared in the early afternoon about an hour after lunch but occasionally occurred even when the patient did not eat. Fulness and a desire to eructate were common. There had been no actual pain at any time. The patient felt better if he was quiet.

Fig. 4.—Internal view of the tumor in case 2. The napkin ring portion is completely infiltrated with cancerous tissue except for a small area of mucosa. The proximal end is enormously dilated.

There was no blood or "coffee grounds" in the vomitus; it would often contain old undigested food. The stools were normal and were usually light in color.

There was borborygmus, with an indefinite sense of resistance in the upper part of the abdomen but no distention. The patient was sallow and the skin loose. Roentgenologic examination made a few days before admission to the hospital revealed obstruction in the upper part of the jejunum. There was no free hydrochloric acid in the gastric contents after twenty-five or after forty-five minutes; the combined acidity was 20 after twenty-five minutes and 16 after forty-five minutes. The gastric contents were bright yellow. The blood showed 4,687,000 red cells and 85 per cent hemoglobin, and the white cell count was 8,120, with 81 per cent polymorphonuclear cells. The Wassermann reaction was negative. The diagnosis was cancer of the upper portion of the jejunum.

Operation on April 12, with the patient under anesthesia with ethylene and local anesthesia, disclosed a firm growth in the upper portion of the jejunum just below the ligament of Treitz. There was no evidence of metastasis. Though the growth was adherent, it was fairly movable but could not be delivered into the wound. The tissues around it were vascular. After resection the upper stump was short. The lower stump was rotated slightly so that the left surface was posterior, and an end to end union was made. Before the suturing was completed a soft rubber tube 5 cm. in length was placed in the lumen and fastened to the posterior margin of the united bowel with a silk suture. A tube gastrostomy was made by inserting a catheter in the stomach near the greater curvature and bringing it out through a stab wound in the abdominal wall.

Fig. 5.—Section of adenocarcomina of the jejunum (case 2). The acini are fairly well formed, and the tumor seems to be about grade 2½. Sections from tissue in the ovary and in the lymph nodes presented the same general structure (× 250).

The specimen consisted of a segment of jejunum 15 cm. in length. The space distally from the tumor to the end of the specimen was 8.5 cm. The growth itself was 3.5 cm. in length. There was some infiltration into the mesentery. Obstruction was caused partly by angulation and kinking, though the center of the tumor showed on section almost complete occlusion of the lumen. The mucosa was edematous and pale yellow. There was no distinctly ulcerated area, though the mucosa was eroded at one point opposite the mesentery. Microscopic examination revealed colloid carcinoma with intervals of adenocarcinomatous structure (figs. 1 and 2).

On December 22 the patient fell and fractured the right tibia and fibula just above the ankle. There was at that time no evidence of a recurrence or metastasis of the cancer. On March 5, 1941 he reported that his general condition "seemed to be excellent."

CASE 2.—Mrs. W. S. B., a white woman aged 57, had a cholecystectomy elsewhere on Aug. 4, 1940. Her symptoms were not relieved. There were intermittent episodes of vomiting which gradually became worse. She occasionally vomited food which had been taken into the stomach two days previously. Between the attacks food apparently passed through normally. Her mental condition was disturbed, and on the day of admission she had two convulsions in which the left side was chiefly affected. Roentgenologic examination made elsewhere before admission did not disclose any lesion in the gastrointestinal tract.

She entered the hospital on November 17 partly unconscious and vomiting at intervals large quantities of fluid in which there was bile. The abdomen was severely distended. Introduction of a Miller-Abbott tube relieved the distention but did not appear to alter the other symptoms.

A careful roentgen examination with the Miller-Abbott tube in position disclosed an obstruction apparently in the middle of the jejunum.

After a transfusion of blood and the intravenous administration of dextrose in Ringer's solution, she was operated on during spinal anesthesia on November 27. In the jejunum was an extensive constricting lesion that appeared malignant. It was removed along with a considerable amount of attached mesentery in order that the involved lymph nodes might be obtained. An end to end union was made, and a medium-sized soft rubber tube about 5 cm. long was sutured to the margin of the anastomosis before the final sutures were placed (fig. 3). There was also a superficial lesion in the cecum, apparently a contact metastasis. The terminal part of the ileum, the cecum and the ascending colon were resected, and an end to side union was made. A tumor of the right ovary and what seemed to be an inflamed appendix epiploica from the sigmoid flexure were also removed.

The specimens consisted of two segments of the intestine (one from the jejunum and another from the terminal part of the ileum, the cecum and the ascending colon) the right fallopian tube and ovary and an appendix epiploica from the sigmoid flexure. The segment of the jejunum was 98 cm. long. The distance from its upper end to the tumor was 43 cm. The proximal portion was greatly dilated. In the mesentery were some small lymph nodes. On section one could see that the tumor almost completely surrounded the lumen of the bowel, though there was one area of mucosa 0.5 cm. wide that was not involved. The growth had a napkin ring appearance and an irregular contour. There was a small ulcerated area; most of the tumor was firm (fig. 4). Microscopic sections showed adenocarcinoma with acini fairly well formed, about grade 2½ (fig. 5). In the segment of the ileum, cecum and ascending colon the lumen was not affected, but the superficial tissues over the ileocecal valve and over the ascending colon showed two lesions, one 1.75 cm. and the other 2 cm. in diameter. Microscopic sections from both showed the same type of adenocarcinoma as that in the jejunum. These lesions doubtless were contact implants. The growth from the ovary measured 4 by 2.5 by 2 cm. There was a constriction near its center. It was of the same structure as the jejunal growth, evidently an implantation metastasis.

The patient's general condition was fairly good after the operation, but her mental symptoms grew worse. It was thought that the mental condition might be caused by avitaminosis and malnutrition, though there was a possibility of metastasis to the brain. Evidences of increased brain pressure appeared, and after consultation with a neurologist it was thought that decompression was indicated. Two days after the abdominal

operation subtemporal decompression was done on the left side, with local anesthesia. After removal of the bone the dura did not pulsate. It was opened, and a small amount of clear fluid escaped. The cortex of the brain was edematous. While the wound was being closed the patient's respirations suddenly ceased and could not be restored.

Necropsy revealed that both anastomoses were in good condition. The upper one was 44 cm. below the ligament of Treitz. There was no evidence of metastasis except one lymph node at the base of the mesentery near the site of the resection of the jejunum and a superficial nodule in the sigmoid flexure. After the brain had been hardened it was examined by Dr. John S. Howe at the Medical College of Virginia, who reported as follows:

"The sections show multiple focal areas of hemorrhage and necrosis chiefly in the white matter of the cerebral cortex, with more or less well defined degenerative changes of the ganglion cells and rather diffuse endothelial proliferation of small vessels, blood in the subarachnoid spaces and one area of coagulation necrosis in the gray matter of the cerebral cortex. No evidence of any metastasis of the tumor is seen. Diagnosis: hemorrhagic encephalitis of undetermined cause. The lesions are somewhat suggestive of those seen in Wernicke's encephalopathy, which have been fairly well shown to be due to deficiency of vitamin B_1. However, the distribution of the lesions is different in this case and if they are due to some vitamin deficiency they are certainly atypical."

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ABSTRACT OF DISCUSSION

DR. FRED W. RANKIN, Lexington, Ky.: Horsley has brought up to date a subject which is rare in occurrence but of more than academic interest. Tumors of the small bowel are rare whether they are benign or malignant. They are difficult of diagnosis and, more important, the malignant ones are uniformly of unfavorable prognosis. My experience with carcinoma of the small bowel was published in a paper in 1930 which reviewed 31 cases. Subsequently in 1933, with Newell, I reported 24 cases of benign tumors of the small bowel. The rarity of occurrence of either type of tumor is emphasized in all reports both in the foreign literature and in that of the United States and, it is interesting to note, the actual percentage varies in the writing of different authors. The symptomatology of carcinoma of the small bowel as a whole presents no characteristic pattern because of the usual failure of stenosis to develop early in the disease. The primary signs and symptomatology are directly related to intermittent obstruction and secondary anemia. The lack of obstruction and variability of the symptomatology depends on (1) the extent of the local growth, (2) extent and situation of metastasis, (3) individual resistance and (4) the grade of the carcinoma. Usually the symptoms are chiefly of intestinal origin. Their duration may vary from a few months to several years, the average being about one year and three months. In our series anemia was the usual picture, although varying with an average hemoglobin estimate of about 59 per cent. In 9 of the cases the reading was below 40 per cent, and the anemia was so progressive as to mimic a picture of pernicious anemia. The determination of the type of anemia whether primary or secondary is relatively easy for a hematologist, but it should be emphasized that this pronounced anemia without visible loss of blood is also a symptom of carcinoma of the right colon and here, as in colonic cancer, repeated tests for occult blood are usually of significance in suggestive cases. Roentgenologic examination is important from a negative standpoint, and only an occasional case will be actually diagnosed by the roentgen ray. Pathologically these tumors are usually adenocarcinoma developing on degenerating polyps, or of the ring type, similar to that found in the lower left colon. Metastasis occurs relatively early, owing to the rich lymphatic supply of the small bowel, and because of the impairment to the digestive function of this portion of the alimentary canal resection of the tumor when possible is desirable. The deplorable prognosis is one of the most unfortunate features of this disease. The range of life following successful surgical removal in our series was from one month to three years, and the average was less than one year. In our experience aseptic end to end anastomosis was the procedure of choice and lateral anastomosis sidetracking the growth was useful as a sidetracking palliative maneuver.

BLOOD PROCUREMENT FOR THE ARMY AND NAVY

PRELIMINARY REPORT

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In January 1941 the Blood Transfusion Association [1] concluded its project in supplying blood plasma to England. This work, carried on in cooperation with the New York chapter of the American Red Cross and subsequently with the assistance of the Brooklyn chapter, was performed almost exclusively by volunteers in nine hospitals in New York and dealt with 17,000 donors during the period August 1940 to January 1941. This was the first time in the history of the country that the procurement of blood was carried on in such a large scale. It was apparent that not only had considerable material aid been given to Great Britain but the knowledge gained in the operation of this project would be invaluable in case of a national emergency in this country.

In February 1941, to fulfil the request of the surgeon generals of the Army and Navy of the United States for 15,000 units of dried plasma, a pilot bleeding unit was established in New York at the Presbyterian Hospital under the auspices of the New York chapter of the American Red Cross. This unit was under the direction of Dr. Charles R. Drew, who had been the medical supervisor of the Blood for Britain Project. It was felt that, by the establishment of such a unit before the need for larger quantities of blood became pressing, the technic and organization could be standardized on the basis of actual experience. This unit was organized with the following aims in view:

1. Efficient collection of large quantities of blood in as short a time as possible.

2. The development of a technic which would enable this to be carried out in as simple a manner as possible without any danger to the donor or damage to the blood obtained.

3. Flexibility of organization and technic so that whether whole blood, serum or plasma was requested the demand could be met with a minimum of adjustment.

4. Adaptability of the organization for civilian use at the conclusion of the present emergency.

This unit was in full operation in May 1941 under my direction when the request for an additional 200,000 units was made. At that time, the medical departments of the Army and Navy requested the American Red Cross and the Division of Medical Sciences of the National Research Council to organize a cooperative project for the collection of blood from volunteer donors. These donors were to be solicited by the American Red

The blood that has been taken in this project has been processed by Sharp & Dohme Laboratories, Glenolden, Pa., whose cooperation in all phases of the work has been of great value.

1. Report of the Blood Transfusion Association Concerning the Project for Supplying Blood Plasma to England, carried on jointly with the American Red Cross from August 1940 to January 1941. Stetten, DeWitt: Blood Plasma for Great Britain Project, Bull. New York Acad. Med. **17**: 27, 1941.

Cross through their various chapters in the localities in which it seemed advantageous to establish bleeding units. The technical aspects of the project, such as determination of the type of equipment, technic and personnel were to be supervised, in an advisory way, by the National Research Council.[2] During the period Feb. 3 to Sept. 18, 1941 this pilot unit has had experience with 10,000 volunteers. This report is concerned with the data that have been accumulated in the conduct of the project.

GENERAL CONSIDERATIONS IN RELATION TO THE DONOR

Every consideration should be given to the volunteer donor. The donor requirements and the technic of bleeding have been set up to afford him a maximum of protection. It is important that all his activities at the bleeding station be under the direct supervision of the physician in charge. All questions as to eligibility of donors and any untoward reactions that occur while the donor is at the station should be brought immediately to the physician's attention. This not only facilitates the operation of the unit but adequately covers the medicolegal aspects.[3]

It is well established that the withdrawal of 500 cc. of blood has no deleterious effect on the health of properly selected donors. In fact it seems to promote the sense of well-being in some donors and improve their general health.[4] Serious accidents [5] have rarely been reported but none have occurred with this unit.

The chief problem confronting the bleeding unit is that of syncope. Not only is it deleterious to the morale of the other donors but it greatly hampers the efficiency of the bleeding unit. A pleasant, interested attitude on the part of the entire staff is of paramount importance. The operation of the bleeding unit should give the appearance of easy and unhurried efficiency. This adds greatly to the impression that the donation of a pint of blood is a simple procedure and not a major ordeal.

Although the donors should be instructed not to eat a fatty meal for at least four hours before coming to donate their blood, it should be emphasized that they should not fast. Some simple nourishment should be taken before coming to the bleeding station. At the conclusion of the venesection facilities should be available for the donor to rest for a short period and to receive some form of nourishment.

Just what part the type of bleeding room plays in the problem of fainting is difficult to evaluate. In general there are two types of arrangement that allow for efficient operation. One has individual cubicles with either fixed or movable partitions, and the other is a common bleeding room with all the bleeding couches in full view. This unit has had experience with both arrangements and has found little to choose between the two plans.

2. The National Research Council assumed responsibility under the terms of the agreement.

3. Martin, E.: Claims of Donor—Medicolegal Study, Med. Klin. **35:** 802-3, 1939. Steinwallner, B.: Medicolegal Aspects of Blood Transfusion, Ztschr. f. d. ges. Krankenhauswesen, June 7, 1938, p. 233.

4. Cadham, Fred: The Effect on Donors of Repeated Limited Blood Loss, Canad. M. A. J. **38:** 465, 1938. Martin, J. W., and Myers, J. T.: The Effect of Blood Transfusion on Donors, J. Lab. & Clin. Med. **20:** 593, 1935. Weiner, A. S.: Blood Groups and Blood Transfusion, ed. 2, Springfield, Ill., Charles C. Thomas, 1939. Riddell, V. H.: Blood Transfusion, New York and London, Oxford University Press, 1939. DeBakey, Michael, and Honold, Edith. Blood Transfusion: Part I, Internat. M. Digest **33:** 301-313, 1938; Part II, ibid. **33:** 367-380, 1938; Part III, ibid. **34:** 49, 1939.

5. Levine, Philip, and Katzin, E. M.: A Survey of Blood Transfusion in America, J. A. M. A. **110:** 1243-1248, 1939. Fatality in a Blood Donor.[10]

PROCUREMENT OF THE DONOR

Duran-Jorda,[6] in reporting his excellent work in the Spanish Civil War, stated that "the success of any transfusion service depended on the organization of the donors." No amount of technical perfection and equipment will be of any value if the supply of donors is not adequate, hence the organization of an efficient recruiting service should be the first step in setting up a bleeding unit. Unless a center can provide at least 50 donors a day, it is not practical to set up a bleeding unit in that locality. Before the unit begins operation, at least 300 donors should be signed up to give blood. The recruitment of donors, particularly in large communities, cannot be done simply by advertising with a few posters and newspaper articles. Experience has shown that personal contacts with fraternal groups, churches, unions, office and department store employees and factory groups is the only way that a large number of people can be reached. This entails much detail work and careful preparation. A single day's bleeding should be planned at from ten to twelve days in advance.

It was quickly ascertained by the pilot unit that if a large number of donors were to be obtained the bleeding unit would have to go to the donor. This not only minimizes the amount of time lost from work by factory or store employees but obviates the necessity of people in the outlying districts coming relatively long distances to a central depot.

The actual organization of the recruiting services will depend largely on the facilities of the local Red Cross chapter. The New York chapter of the American Red Cross, at the instigation of the executive director, General Robert C. Davis, has established a volunteer blood donor service under the direction of Colonel Earle Boothe. This service sends cards to each of the donors showing the amount of blood given, the type [7] and a report of the serologic test. It is much like the certified donor cards that the various volunteer and professional transfusion bureaus throughout the world have employed.[8] Not only is this information of value to the donor himself but it also serves in communities and store and factory groups as a foundation on which a local volunteer transfusion service may be established. Such a service is of great value to a community in dealing with its local health problem.

DONOR REQUIREMENTS

The following requirements have been established, after a survey of the standards of the various volunteer services that have been in operation in this country [9] and in Europe [10] and, in particular, those which have

6. Duran-Jorda, F.: Lancet **1:** 773 (April 1) 1939; Rev. san. de guerra, No. 8, Dec. 1937. Pittaluga, M. G.: Some Considerations of Blood Transfusion During the Civil War in Spain, Mem. Acad. de chir. **65:** 1080-1090, 1939.

7. Typing was formerly done by the bleeding unit but now is performed at the processing plant.

8. Kubanyi, E.: Three Years Activity in Blood Donor Centers—Municipal Hospitals in Budapest, Zentralbl. f. Chir. **65:** 2557-2560, 1938. Schrumpf, A., and Hartman, O.: Report from the Norwegian Red Cross Blood Transfusion Service, Norsk. mag. f. lægevidensk. **3:** 2247-2255 (July) 1939. Skold, Erik: Donors and Centers and Transfusion Technic: Various Countries, Svenska läk.-tidning. **36:** 273-304 (Feb.) 1939. Canadian Transfusion Services.[11] Weiner.[4]

9. De Kleine, William: Red Cross Blood Transfusion Projects, J. A. M. A. **111:** 2101-2103 (Dec. 3) 1938. Hoxworth, Paul: Improvement in Blood Transfusion Service: I. Selection of Test Serums; Cause and Prevention of Hemolytic Reactions: Role of Subgroups A_1 and A_2, Arch. Surg. **42:** 321-337 (Feb.) 1941. Hoxworth, Paul, and Skinner, Calvin: II. Establishment and Operation of a Blood Transfusion Service (Cincinnati), ibid. **42:** 480-497 (March) 1941.

10. Oliver, P. L.: A Plea for a National Blood Transfusion Conference, Brit. M. J. **2:** 1032, 1936. The Victoria and Australian Red Cross Blood Transfusion Services, editorial, M. J. Australia **12:** 363-364, 1941. Dyke, S. C.: The Organization of a Voluntary Hospital Blood Transfusion Service, Lancet **1:** 1538, 1937. Leeman, N.: Blood Banks in Private University Hospitals, Med. Welt. **14:** 433-444, 1940. Kubanyi,[8] Schrumpf and Hartman.[8] Skold.[8]

been set up by the British,[11] French,[12] Spanish,[6] Australian[13] and Canadian[14] transfusion services during the present war. Certain of our own modifications have been added as the project has progressed:

1. Age: Donors between 21 and 60 years of age are accepted. Under no circumstances is the age limit of 60 to be exceeded. Written permission is required from the parents or legal guardian before suitable minors of either sex may give blood.

2. Sex: Both male and female donors are accepted.

3. Race: Only white donors are taken.

4. Temperature: A donor is not acceptable if the temperature by mouth (three minutes) exceeds 99.5 F.

5. Hemoglobin: No donor is acceptable unless the hemoglobin level is 80 per cent or above. The hemoglobin is to be determined by one of the generally accepted technics (e. g. Dale, Tallqvist, Sahli).

6. Blood Pressure: No donor is acceptable unless the systolic blood pressure is between 100 and 200 mm. of mercury.

7. Pulse: The pulse is to be recorded. Particular note is made of irregularity as well as decided bradycardia or tachycardia.

8. History: The donor is asked the following questions:

1. When did you last donate blood? (At least eight weeks must elapse between each donation.)
2. Have you had any illness in the last month?
3. Have you ever had malaria? tuberculosis?
4. Did you ever have shortness of breath?
5. Have you had swelling of the feet?
6. Have you had a persistent cough?
7. Have you pain in the chest?
8. Have you coughed up blood recently?
9. Do you have fainting spells?
10. Do you ever have convulsions?

If these requirements are adhered to, protection is given to the donor and the possibility of transmission of disease from donor to the eventual recipient is reduced to the minimum. Syphilis, malaria, influenza, measles, allergy, smallpox and disease caused by the rickettsia organisms, and, in the Orient, parasitic diseases such as filaria, have been reported[15] as transmitted by transfusion of whole blood. The entire question of syphilis will be dealt with under the heading "serology." All persons with recent attacks of malaria or who have had several infections in the past should be turned down. This protects also the donor, since the withdrawal of 500 cc. of blood has been known to cause an exacerbation of the disease. The pooling of the plasma of from 25 to 50 persons should eliminate the danger of transference of any allergy. The history and the evaluation of the general health of the donor should reduce to a minimum the possibility of transference of the other conditions mentioned. Further regulations may be drawn up to control the transmission of any disease that is known to be endemic in a particular locale.

11. The Army Blood Transfusion Service: I, editorial, Nursing Times, London **36:** 223-224 (March 2) 1940; Blood for the Army: I, ibid., pp. 228-229; Blood for the Army: ibid. **36:** 254-255 (March 9) 1940; The Army Blood Transfusion Service: II, pp. 256-258. Edwards, F. R., and Davie, T. B.: Preserved Blood: An Analysis of Its Use—Report from the Merseyside War Blood Bank, Brit. M. J. **2:** 73-77 (July 20) 1940. Solandt, O. M.: The Work of a London Emergency Blood Supply Depot, Canad. M. A. J. **44:** 189-191, 1941.

12. Causeret and Jeanneney: Organization of Military Centers for Transfusion of Conserved Blood, Bull. Acad. de méd., Paris **121:** 722-724, 1939. Maisonnet and Jeanneney: The Transfusion of Preserved Blood for the Army, Mém. Acad. de chir. **64:** 1000-1004, 1938. Jeanneney and Castanet: Selection of Donors in Respect to the Transfusion of Blood, Progrès méd. **1:** 861-866, 1938.

13. Wood, L. J.: Transfusion of Stored Blood: Organization of Blood Transfusion Service in Times of National Emergency, M. J. Australia **2:** 768-774 (Nov. 18) 1939.

14. Canadian Transfusion Services: Personal communication to the author.

15. Douglass, Thomas: A Collective Review of the Literature from 1934 to 1939, Surg., Gynec. & Obst. **71:** 171-188, 1940. Weiner,[4] Riddell,[4] DeBakey and Honold,[4] Levine and Katzin.[5]

THE BLEEDING SET

It was recognized at the outset of this project that the number of satisfactory ways of obtaining blood were myriad. However, when this subject was considered it was felt that whatever bleeding set was used should meet certain general requirements.

1. It must be a completely "closed" system.[16] This means that there should be no manipulations in the assembly of the set from the time it is originally autoclaved until the venesection is completed.

2. There should be no chance for transference of any air into[17] the bleeding bottle which does not pass through a cotton bacterial filter.

3. The parts of the set should be as few as possible. They should be easy to clean and, in order to minimize air leaks, there should be as few joints as possible between the parts.

4. The diameter of the tubing[18] that carries the blood from the vein into the bottle should be appreciably larger than that of the needle in order that the flow of blood will be rapid and uninterrupted.

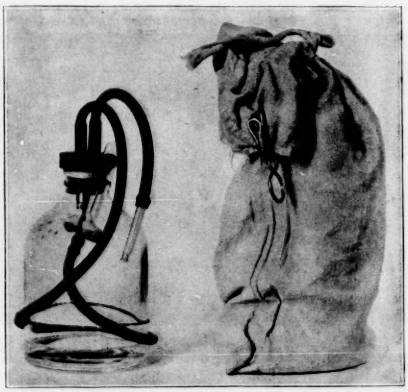

Fig. 1.—The bleeding set used by this unit. The bottle contains 50 cc. of 4 per cent sodium citrate solution. The set is sterilized in the muslin bag.

5. The bottle should have an adequate diameter, approximately 3½ inches, so that there will be no need to agitate the blood to prevent clotting during its collection.

6. The bottle should have a capacity of 550 cc. so that there will be a minimum of air space remaining after the withdrawal of the full 500 cc. of blood.

7. Mouth suction[1] or negative pressure[19] obtained by anything other than a simple hand pump should never be employed.

8. The inlet tubing of the set should be transparent and preferably of latex. Gum rubber tubing tends to stick together after being autoclaved.

9. The needle should be of a fairly large caliber. Gage 15 has been found to be suitable for both male and female donors.

16. Riddell,[4] Duran-Jorda,[6] Pittaluga,[6] Edwards and Davie.[11]

17. Biddle, E., and Langley, G. F.: Transfusion with Conserved Blood, Brit. M. J. **1:** 555-556, 1939. Johnson, B. A., and Meleny, F. L.: Bacteriological Control of the Various Stages in the Preparation of Plasma and Serum, Proc. Am. Serum A., 1941.

18. Tuohy, Edward B.: Blood Transfusion and the Storage of Blood for Emergency Procedures, Surgery **4:** 261-270, 1938.

19. Fatality in a Blood Donor, editorial, Brit. M. J. **2:** 311 (Aug. 31) 1941.

The exact dimensions and shape of the bottle are of little moment but the bottle should be designed to fit the available centrifuges and be readily obtainable and easy to clean. In order that the inlet tubing fit tightly about the needle, it is preferable that it have a hose hub. The needle that has been employed in this project has a cross bar just distal to the hub, similar to the Lewisohn needle. This type is strongly recommended, as it facilitates handling without contamination and can be left in place in the donor's vein without being held or having some sort of adhesive strapping applied.

Figure 1 shows the bleeding set used by this unit. The bottle contains 50 cc. of 4 per cent sodium citrate.

ORGANIZATION

There are two main functions of a blood donor service —that of recruiting the donors and that of bleeding them. It suffices to say that the recruiting of the donors should be carried out by a full time director. The organization of his staff depends on the individual requirements of the local Red Cross chapter.

The most effective personnel for a bleeding unit is one physician, one secretary, four nurses and one or two shipping clerks. This staff is similar to that employed by the various depots of the British Transfusion Service.[20] Such a unit can easily care for 75 to 80 donors in from four to six hours and has bled 100 male donors in less than four hours. With a personnel of this size, two functions of the work are left to volunteers, namely receptionist work and the dispensing of refreshments. The unit is organized on the basis of employing as few physicians as possible, with emphasis on a highly efficient nursing group. Not only is this a workable plan but in times of national emergency it would permit widespread extension of the work with the addition of a relatively small number of physicians.

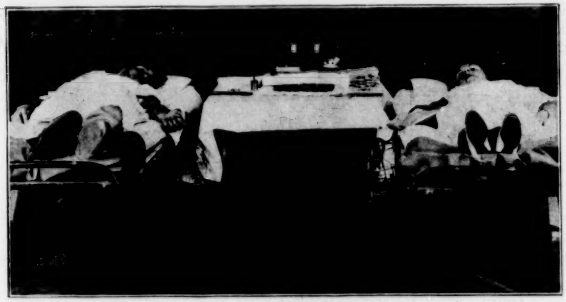

Fig. 2.—This unit of one work table and two beds, under the supervision of one nurse, is the basis on which the bleeding center is set up. It will be noted that men and women use the same bleeding room.

If feasible, the space employed should be so arranged that the donor progresses consecutively from registration through to the completion of the bleeding. On arrival at the bleeding station, the donor is directed to the unit's secretary, who registers him on the permanent record card and witnesses the signature of the release. At this time, the tag for the bleeding bottle and the sticker for the serologic sample are filled out. The hemoglobin content is determined and the temperature, pulse and history are taken by one of the nurses at a second table. The donor is then referred to a dressing room. White gowns similar to the so-called Hoover apron have been provided for the donor by this unit. He is then directed to the bleeding room, where his blood pressure is determined. The physician in charge checks the record card to see that the donor has met the minimum requirements.

The basis of the arrangement of the bleeding room is a unit of two beds and a work table under the supervision of one nurse (fig. 2). As many as six of these units can be efficiently handled by one experienced physician. Whether a single large bleeding room or the cubicle system is adopted the floor plan should be such that the physician can at all times oversee the bleeding of each donor.

VENESECTION

If the donor fulfils the established requirements, a small area about the site of the vein selected for venesection is prepared with soap, alcohol, iodine and alcohol. An intradermal wheal of 1 per cent procaine hydrochloride is administered. The bleeding set is removed from the muslin bag by the nurse. The physician unsheathes the needle from its Wassermann tube covering and introduces it into the vein. Unless something untoward arises, the rest of the phlebotomy is carried out by the nurse. It should be noted that no sterile drapes, masks, gloves or special gowns are used. "Cutting down" on a vein is never employed.[21] No more than two attempts to obtain blood should be made on a donor.

The procaine hydrochloride is supplied in 2 cc. syringes, a separate needle being used for each donor. These needles are kept in individual cotton-stoppered tubes. The syringes are all filled at the start of the bleeding day by a nurse using operating room technic. Each syringe will supply sufficient procaine hydrochloride for six or eight wheals and is not refilled unless it has been autoclaved.

The donor assists in maintaining the flow of blood by slowly opening and closing his hand. Suction is rarely employed and then only a small hand pump is used.

At the conclusion of the bleeding, the inlet tube is clamped as close to the bottle as possible and the serologic sample obtained by stripping the distal portion of the tubing. The arm is cleansed and a suitable dressing applied over the site of venepuncture. The bleeding bottle is then properly tagged and the sticker applied to the serologic sample. Both are placed immediately in a constant temperature ice box. After the donor has rested on the bleeding couch for ten minutes he is directed to the refreshment room.

REFRIGERATION AND TRANSPORTATION

The cooling of the blood [22] should be begun as soon as possible after it has been taken. When the unit is operating at a fixed station the blood taken should be placed in a constant temperature ice box which maintains a range of from 2 to 4 C. This ice box should

20. The Army Blood Transfusion Service, editorial, The Bystander, London, May 22, 1940, pp. 232-233; also the editorials referred to in footnote 11.

21. Riddell.[4] Oliver.[10]

22. Scudder, John: Studies in Blood Preservation: The Stability of Plasma Proteins, Ann. Surg. **112**: 502-919, 1940. Duran-Jorda.[8] Hoxworth and Skinner.[9] Pittaluga.[5]

be of the "blood bank" type with no "cold spots." It should have a temperature recording device and an alarm system to warn of any deviation. Small, portable,[23] insulated boxes that have a bunker for solidified carbon dioxide are suitable for operation with the mobile unit. Ordinarily, solidified carbon dioxide should never be employed as a blood refrigerant. However, since the box is in use for a relatively short period of time, is frequently opened and the solidified carbon dioxide has no direct contact with the blood, it has been found that it is safe to use such a container for the mobile unit.

TABLE 1.—*Summary of Experience with Procurement of Blood from February to September 1941*

Month, 1941	Number of Donors Who Came to Donate	Number of Bleeding Days	Number Rejected	Number Accepted	No Blood Obtained	Blood Obtained	Positive Serology
February	850	21	22	828	14	814	2
March	1,184	28	33	1,151	14	1,137	4
April	1,144	26	45	1,099	6	1,093	2
May	1,974	25	35	1,939	8	1,931	6
June	1,859	26	40	1,819	14	1,805	0
July	1,619	22	53	1,566	19	1,547	4
August	851	19	46	805	3	802	2
September 1-17 inc.	519	11	33	486	3	483	4
Totals	10,000	178	307	9,693	81	9,612	24

If the blood is not allowed to go below zero or above 10 C. during the time that it is in transit to the processing plant, no damage will be done to the blood. A large, portable refrigerator box, known as a Church container, has been successfully employed by the New York unit. This container, which has racks for 80 bleedings, must be precooled with solidified carbon dioxide for from eight to twelve hours before use. A bunker is provided for the ice that is used as the refrigerant in transit.

SEROLOGY

It can be seen from table 1 that there were 24 persons who gave a positive serologic reaction out of 9,693 accepted—a rate of 0.249 per cent. Blood from these persons of course was discarded. This incidence is quite low but not unusually so when compared with figures gathered from similar volunteer services.[24] Each of these 24 persons was interviewed and none had any previous knowledge of having had syphilis. Inquiry regarding the history of syphilis is distasteful to some persons and with this group questioning regarding it would not have elicited any pertinent information.

TABLE 2.—*Cause for Rejection*

Cause	Donors
Low hemoglobin	40
Elevated temperature	27
Over or under age	61
History and physical findings	108
Miscellaneous	71
Total	307

There are at least 20 well authenticated cases in the literature of transmission of syphilis [25] by transfusion of whole blood when the donor's serologic reaction was negative. Recent work [26] has shown that it is doubtful whether Treponema pallidum will survive three days' refrigeration at 5 C. The plasma collected in this project is refrigerated for at least two weeks at a temperature far below this. More recent work has shown further that when serum or plasma is desiccated [27] the organisms do not remain viable even when heavily infected specimens are tested. I believe that these data definitely rule out any possibility of the transmission of syphilis by the plasma that has been collected.

All dealings with the donor regarding a positive serologic reaction should be undertaken with the full recognition of the medicolegal complications involved. The word "syphilis" should not be mentioned in any written communications between the bleeding center and the processing plant or between the physician and the donor. Reports from the processing plant should simply state "Sample # —— was found to be unsatisfactory." Every effort should be made to secure a second sample from the donor for a confirmatory test at another laboratory. The donor is then requested to give his written permission for the results to be forwarded to his personal physician. By dealing with the matter in this fashion, the physican in charge properly disposes of his public health obligations and terminates the physician-patient relationship that had been established by the donor coming under his care at the bleeding center. Such a program has been successful without exception in this unit and has had no unpleasant sequelae.

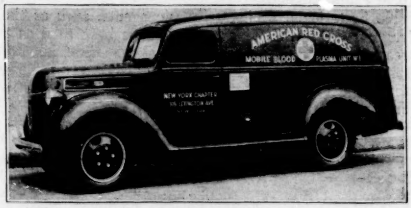

Fig. 3.—A standard 1 ton delivery truck is used as the ambulance for the mobile unit. This can carry equipment to take care of 200 donors.

CONTAMINATION

When material as highly susceptible as liquid plasma is being dealt with the problem of contamination is very real. The chief factors in the maintenance of sterility by the bleeding unit are:

1. The bleeding set should be autoclaved in a protective muslin covering so that the entire set may be kept sterile up to the time of its use.
2. No bleeding set should be used more than fourteen days after being autoclaved.
3. The containers used to ship the bleeding sets should be locked with wire seals.
4. If there is any question of a mechanical defect in any portion of the bleeding set, the set should be discarded.
5. A set should be discarded if any foreign body appears in the citrate solution or in the inlet tubing.
6. If either of the cotton filters are wet, the set should be discarded.
7. All palpation for difficult veins should be done before the arm is prepared, so that venepuncture may later be performed by a "nontouch" technic.

23. Duran-Jorda.[6] Maisonnet and Jeanneney.[12]

24. Greey, P. H.; Bracken, M. M., and Paul, E.: The Laughlen Test and Blood Donors, Canad. M. A. J. **42**: 126-128 (Feb.) 1940.

25. Klauder, J. V., and Butterworth, Thomas: Accidental Transfusion of Syphilis by Blood Transfusion, Am. J. Syph., Gonor. & Ven. Dis. **21**: 652-666, 1937. Turner, T. B., and Diseker, T. H.: Duration of Infectivity of Treponema Pallidum in Citrated Blood Stored Under Conditions Obtaining in Blood Banks, Bull. Johns Hopkins Hosp. **68**: 269-279, 1941.

26. Bloch, Oscar, Jr.: Loss of Virulence of Treponema Pallidum in Citrated Blood at 5 C., Bull. Johns Hopkins Hosp. **68**: 412-415, 1941. Turner and Diseker.[25]

27. Turner, T. B.; Bauer, J. H., and Kluth, F. C.: The Viability of the Spirochetes of Syphilis and Yaws in Desiccated Blood Serum, Am. J. M. Sc. **202**: 402, 1941.

8. A needle should not be used for more than a single penetration of the skin.

9. If an air leak or other mechanical defect appears during the course of bleeding, such a set should be referred for an individual sterility test.

10. The contamination rate rises in proportion to the number of persons performing the venesection.

11. The sterile material employed must be prepared by autoclaving at 250 C. for thirty minutes.

12. Absolute refrigeration control must be maintained from the time that the blood is taken until it reaches the processing plant.

13. Transportation should be so arranged that the plasma can be separated from the cells within forty-eight hours after the blood has been withdrawn from the donor.

14. The personnel should be on a full time basis. Volunteers should have no part in the actual bleeding of the donor.

By employing the "closed" system, many of the factors in contamination that are inherent in other types of bleeding sets are obviated. As simple as is the bleeding process with this technic and equipment, it is paramount that each small detail is meticulously adhered to. It is the accumulation of what may seem to be small and unimportant variations that produces contaminations.

No bactericidal or bacteriostatic agents, such as the drugs of the sulfonamide group,[28] have been used as a preservative for the blood as it is taken. Experimental work [29] carried out in connection with this project has cast considerable doubt on the efficacy of these drugs in eliminating contamination.

TABLE 3.—*Donors Accepted*

Month, 1941		Total	No Blood Obtained	Double Puncture	Fainted or Stayed Longer Than Usual Period
February	Male	381	3	18	30
	Female	447	11	22	17
March	Male	537	4	9	21
	Female	614	10	36	41
April	Male	638	..	17	25
	Female	461	6	18	35
May	Male	1,060	1	22	59
	Female	879	7	40	54
June	Male	914	4	15	41
	Female	905	10	31	57
July	Male	918	8	13	27
	Female	648	11	28	31
August	Male	420	1	6	13
	Female	385	2	14	9
September 2 to 17	Male	353	1	3	9
	Female	233	2	5	7
Totals	Male	5,121 (53%)	22 (0.429%)	103 (2.01%)	225 (4.39%)
	Female	4,572 (47%)	59 (1.29%)	194 (4.24%)	251 (5.49%)
Grand total		9,693 (100%)	81 (0.835%)	297 (3.076%)	476 (4.8%)

MOBILE UNIT

More than 40 per cent of the blood obtained by the New York bleeding center has been collected by a mobile unit. The personnel and the arrangements of the space available should be as similar as possible to those outlined for the fixed group. This mobile unit has operated within a radius of 100 miles from New York. Bleeding has been done in factories, recreation rooms of office buildings and department stores, college infirmaries, community centers, woman's clubs, church parlors, hospital wards and in the open at the American Red Cross camps. The blood taken has been transported over all types of terrain and during all seasons of the year. So far, there has been no more loss due to breakage, hemolysis or contamination than has occurred with the fixed group. The feasibility and necessity of establishing mobile units in war time is borne out by the experience of the British Transfusion Service.[30] Implications for its use in times of peace for civilians should be borne in mind. This has been previously suggested by DeGowin [31] and by Strumia and McGraw [32] for areas in which the population is highly decentralized.

TABLE 4.—*Percentage of Loss of Bloods from All Causes*

Out of Every 100 Donors	
3.000 %	rejected
0.810	no blood obtained
0.249	positive serology
0.743	breakage
1.200	contamination
6.002 %	

No special material is necessary to equip the mobile unit other than the portable refrigerators. A standard 1 ton delivery truck (fig. 3) will carry material and refrigerating facilities for 200 donors. The equipment is identical with that of the fixed group, except that beds, chairs and tables are of the folding or collapsible type. Duplication of equipment and personnel gives complete flexibility to these two units and allows for some shifting of personnel, when a particularly heavy load is imposed on either one.

RESULTS

Table 1 gives a statistical summary of the experience with 10,000 persons who presented themselves as donors during the 178 bleeding days between Feb. 3 and Sept. 17, 1941. This is an average of 59 donors a day. At no time has the capacity of the unit been approached. The two units that have been in operation can easily handle 3,500 donors a month, working a five and one-half day week.

It will be noted that 307 prospective donors were rejected. The reasons for these refusals are noted in table 2.

It is interesting to compare the results obtained from the two sexes (table 3): 53 per cent of the donors were males and 47 per cent were females. Undoubtedly there are more females who present difficulties in venesection, but when the figures are broken down according to sex the technical difficulties encountered with the females are not nearly as impressive as might be expected.

In a project of this size it is necessary to determine how many full bleedings arrive in a usable condition at the processing plant as compared to the number of persons who come to give blood at the bleeding center. Such a figure includes losses from all sources. The bloods of 24 donors (0.249 per cent) were discarded because of a positive serologic reaction. Breakage in

28. Hunwicke, R. F.: Sulfanilamide as a Preservative in Stored Blood, Brit. M. J. **2**: 380-381 (Sept. 21) 1940. Novak, Milan: Preservation of Stored Blood with Sulfanilamide, J. A. M. A. **113**: 2227-2229 (Dec. 16) 1939; The Use of Sulfonamide Derivatives as a Solution to the Problem of Bacterial Contamination in Stored Plasma, ibid., to be published. Becart, A., and Philippe, B.: Human Plasma Treated with Sulfanilamide; Advantages for Emergency Transfusions in Absence of Donors, Especially in War Time, Presse méd. **48**: 535-537, 1940.

29. Heath, F. K., and Province, W. D.: Report of Studies on the Preservation of Human Plasma with the Sulfonamide Compounds, to be published.

30. Solandt.[11] The Army Blood Transfusion Service [20]; also editorials referred to in footnote.[11]

31. DeGowin, E. L., and Hardin, R. C.: Plan for Collection, Transportation and Administration of Whole Blood and Plasma in Warfare, War Medicine **1**: 326 (May) 1941.

32. Strumia, M. M., and McGraw, J. J.: Frozen and Dried Plasma for Civil and Military Use, J. A. M. A. **116**: 2378-2382 (May 24) 1941.

handling at the bleeding unit, in transportation or in centrifuging accounted for the loss of seventy-two bottles (0.743 per cent). Fifty of these were lost in a single shipment which was improperly packed. With the type of equipment in use and the facilities for transportation now employed, the loss from breakage in the future should be negligible. Twenty-seven liters of plasma citrate mixture (1.2 per cent) was lost by contamination. This represents the blood from ninety-nine bleedings in two pools. The loss from all causes amounts to 6.002 per cent,[33] in other words, to have 100 usable bleedings at the processing plant approximately 106 donors must come to donate their blood (table 4). Although every effort is made to obtain a full bleeding from a donor, this is not always possible. It is necessary therefore to determine the average plasma-citrate yield from each bleeding. This was 273 cc. However, since 300 cc. of plasma is required to fill the final dispensing unit, it is necessary to have 109 usable bleedings to produce 100 units of dried plasma. If the 6 per cent loss previously mentioned is added, 115 donors are necessary to yield enough material for each 100 units of dried plasma-citrate mixture.

Presbyterian Hospital.

THE PRINCIPLE OF TRACTION IN THE TREATMENT OF URETEROLITHIASIS

ROY P. FINNEY, M.D.
SPARTANBURG, S. C.

Tiny calculi impacted in the pelvic segment of the ureter can be as tantalizing to the physician as they are agonizing to the patient. As a rule these curious pseudogeologic formations should be removed as quickly as possible, before the onset of certain painful and dangerous complications and/or sequelae.

The trouble one may encounter in extracting a stone from the ureter varies greatly and is wholly unpredictable. Thus a relatively small stone may require open operation, while another much larger may respond favorably to the slightest manipulation. This unpredictable behavior doubtless is the fault of the ureter, which from the standpoint of biomechanical efficiency leaves much to be desired. It is too small in caliber, too fragile and too keenly sensitive to reflex stimuli. A combination of these and other faults makes the removal of a stone by manipulation one of the most uncertain and often one of the most difficult procedures in medicine.

Dr. Hugh Hampton Young, first in so many beneficial contributions to the science of urology, was first to discover that a ureteral calculus may be made to pass by poking and prodding with instruments of various sorts inserted into the ureter by way of the newly invented cystoscope. His first success with this method came in 1902.

The passage of forty years has brought certain technical refinements and a dignified name to Dr. Young's original procedure. The physician may now select from a large number of ingenious instruments and an array of vastly improved cystoscopes. The method itself, in which an operator has at the stone with unlimited stretchings, pokes and prods, is called "manipulation."

Manipulation is no doubt a valuable addition to genitourinary procedure. However, urologists differ considerably in their estimate of its worth. C. B. Squires, reporting on the treatment of 606 patients at the Crowell Clinic (1915 to 1930) said: "Manipulation was successful on 528 patients. Only 44 required open operation."

Likewise, Fowler and Champion have been highly successful with manipulation. In their office practice 76 per cent of patients responded to conservative treatment, an excellent record considering the fact that the patients usually continued work throughout treatment. Their favorite instruments were catheters and the spiral dislodger.

In contrast there is Higgins' review of 350 cases of ureteral calculi in which treatment was given at the Cleveland Clinic. Manipulation failed or was not attempted in 228 cases. However, the figures are misleading to any one unacquainted with Higgins' exceptional success in open operation. In 228 cases of ureterolithotomy he and his colleagues had a mortality of less than 1 per cent. It is but natural that they should be partial to open operation, using transurethral manipulation infrequently and with little faith.

Manipulation permits the greatest freedom in technic on the part of the operator, who may improvise to his heart's content. Every one who has mastered the use of the cystoscope has wished for an instrument with which he might safely grasp a calculus and pull it out of the ureter on the spot. To grasp and pull, that is the primitive, the satisfying way of getting a calculus or any desired object, and many ingenious types of forceps have been devised for the purpose. However, because of certain difficulties attending the use of a forceps in the human ureter, no dependable model has yet been constructed.

Briefly these difficulties are as follows:

1. A useful forceps must be rugged in construction, with strong serrated jaws. Yet it must be small and have a semiflexible shaft.

2. Since the forceps must grasp the stone blindly, some provision has to be made to prevent inclusion of the mucosa of the ureter.

3. Granted that these difficulties are solved, a really discouraging fact remains: Only extremely small calculi may be pulled through the ureter. A calculus as large as a 22 caliber bullet if pulled out at one manipulation will likely strip the ureter of much mucosa. Moreover, should a stricture be encountered, an overzealous operator may actually tear the ureter apart.

These observations are not wholly original. However, I did confirm them by a bit of research done some years ago. While engaged in it I became more and more skeptical about the use of a forceps in so delicate a structure as the ureter. In the end I became convinced that I had proved a fact of considerable importance, to wit: It is impossible to pull a calculus out of the ureter with a forceps. This means, of course, that all so-called ureteral forceps are useless. It is true that when the stone is engaged in the meatus and is visible one may deliver it with a forceps. But it is better to do a meatotomy instead.

Lack of space forbids a detailed description of my experiments, performed mostly on large dogs properly anesthetized. The procedure was as follows:

Having exposed and opened the ureters, I implanted calculi of varying sizes and shapes and attempted to

33. Since the completion of this paper, it has been ascertained that 1 donor was diagnosed as having typhus fever forty-eight hours after he had given his blood, and it was felt that all the bleedings that had been pooled with his blood should be withdrawn. This adds a further loss of thirty-six bloods.

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grasp them in forceps inserted transvesically from below. I used every type of grasping instrument that the ureter would receive. It was next to impossible to get a firm hold on the stones. On the few occasions when I did succeed a bit of mucosa was invariably included in the bite.

Next, by using one hand to steady the ureter and to manipulate the stone which it contained I was able to get a firm hold on the calculus without including the wall of the ureter. My object was to settle the important question of whether a stone cleanly grasped by a forceps may be pulled out of the ureter. The answer is no. Only the tiniest calculi would respond to reasonable traction, and even they produced serious trauma. Before the medium-sized and larger stones could be moved the ureter would tear.

By interposing a small scale between my hand and the forceps I could measure in pounds how much pull the ureter would take without tearing. All ureters withstood 5 pounds (2.3 Kg.), but none endured a pull of 10 pounds (4.5 Kg.).

Trauma, severe in every case, varied from more or less complete stripping of the mucosal layer to complete divulsion of the ureter.

Having rejected the use of forceps as unsound, I turned to an idea which had occurred to me several years before but which had not been put to the test. It was to loop a ureteral catheter around the stone and use it as a medium for traction.

Fig. 1.—Calculus firmly held within loop. Intermittent traction delivered it in twelve hours.

There were several objections to this procedure. First, was it possible to lasso a foreign body wedged in so small a canal as the ureter? Second, what if success is so complete that having engaged the stone one finds it refusing to budge in any direction? Third, what of the trauma just described? Could it be avoided?

Happily, none of these objections were real. It is not difficult to lasso a stone in the ureter. As to the second objection, in 50 cases I did not encounter a calculus fixed so firmly in the ureter that it could not be dislodged. Some trauma was produced, of course, but in no instance was enough mucosa stripped from the ureter to delay recovery.

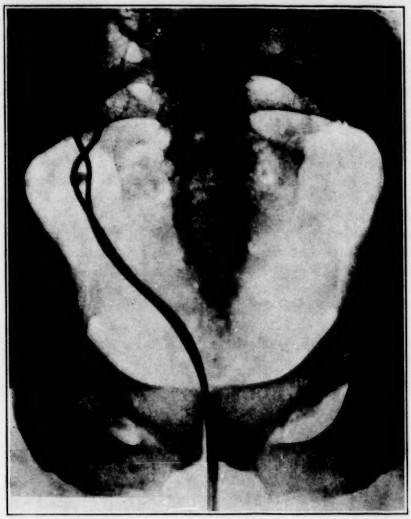


Fig. 2.—Double loop caused by unintentional twist in catheter. Calculus engaged by proximal loop.

The technic is rather simple. In all but 5 of the 50 cases the stone was removed with a home-made instrument constructed as follows: A no. 6 F. x-ray catheter, with either a whistle tip or a taper tip, was modified by inserting a silk suture in the distal end, care being taken to tie the knot as small as possible.

A wire stilet should be inserted to stiffen the catheter, which is now ready for use. The catheter with thread attached is passed transvesically to the stone and beyond it if possible. Should it refuse to pass, a local anesthetic is injected and afterward a few drops of liquid petrolatum for lubrication. In nearly every instance the catheter will then pass with little difficulty. However, one will fail now and then in spite of patience and the use of a Blasucci tip. When this occurs one may often succeed by using spinal anesthesia, which does away with spasm as well as most of the pain. Only once in 50 cases was I unable to pass the stone.

If one has succeeded thus far, the thread-bearing catheter is moved on until the renal pelvis is reached. At this point the stilet is withdrawn a few inches and the cystoscope removed, the catheter being left in place. By pushing toward the kidney with the catheter and pulling away from it with the suture one may make a loop without difficulty or injury. There is plenty of room in the dilated renal pelvis. Once the loop has been made, thread and catheter are pulled down the ureter together until the stone is engaged in the loop. No doubt is experienced as to when this occurs, since firm resistance is encountered.

One now is in position to put as much traction as one wishes on the stone, for the loop rarely slips. It is best, I am sure, not to use more pull than 1 or 2 pounds (0.5 or 0.9 Kg.). However great the temptation, one must never try to remove the stone immediately. A small scale is attached to the end of the catheter, the patient is put to bed and pain is controlled by means of an opiate. The nurse is instructed to exert a pull of 2 pounds (0.9 Kg.) on the scale, maintaining it for a moment, every hour or two for twenty-four hours. At the end of that time the patient is given a bit of gas and a pull up to 5 pounds (2.3 Kg.) is made by the physician himself.

In my series of 50 cases the stone was obtained at the end of twenty-four hours in 47. Treatment was continued in the 3 cases of refractory calculi, being successful in 2, in which the stone was passed in thirty-four and forty-two hours respectively. The treatment in the third case was a failure. Having kept the loop in place for seventy-two hours without budging the calculus, I removed it by open operation. Failure was due to the unfavorable relationship of the greatest diameter of the stone to the lumen of the ureter and to the fact that it was actually embedded in the wall of the ureter.

SUMMARY

A new method of extracting ureteral calculi by means of traction is superior to methods now in use in the following respects: (*a*) A firm grasp on the stone may be had without including mucosa. (*b*) In contrast to older methods, only one cystoscopic treatment is necessary. (*c*) It is practically free from danger, provided the simple technic is followed with ordinary care.

134 Pine Street.

ABSTRACT OF DISCUSSION

DR. V. D. LESPINASSE, Chicago: I was interested to hear Dr. Finney's utilization of the loop. As I understand it, he makes his loop in the pelvis of the kidney. That is a neat little technical trick. A similar method was described about five or six years ago in the German urologic literature. The loop in the ureter was made right at the stone. If one is going to do that it must be necessary for the ureter to be large enough to make the turn or for the catheter to be supple enough so that it will not distend the ureter too much. This is the method I have used in five cases. It has worked very well and I have always obtained the stone. I have always checked the size of the ureter by urogram before attempting this procedure and I made various types of loops of various lengths. That is very important. The longer the loop, the larger the ureter must be in which to produce the loop. I have used for a good many years a method of my own concerning which Dr. A. J. Carlson, in commenting on it, said "Lespinasse, that is damned good physiology"; so I call it the physiologic method. I put an obstruction in the ureter and let the ureter dilate above the obstruction until it reaches the size of the stone and then remove the obstruction, and the stone comes down and out. About every six months for many years I have some instruments made to use in the ureter to enable the stone to pass. There is a small multiple curet that one can slide along past the stone, and if the stone has some bumps one can shave or chisel off these rough places, and then the stone will come along much faster. I want to congratulate the doctor on this experience and his experiments: I think they are very fine.

DR. GEORGE R. LIVERMORE, Memphis, Tenn.: I should like to sound a note of warning on intraureteral manipulation. Having been one who devised one of these instruments for the dislodgment of ureteral stones, I wish to go on record as condemning all metal instruments for promoting the removal of stones in the ureter. The ureter is easily damaged, and since the introduction of American catheters, which are much stiffer than the ordinary catheter that we have been using, I find that puncture of the ureter is becoming much more frequent. Recently Heckel reported 15 cases in which the ureter had been punctured. After an experience of thirty years in urology I had my first puncture of a ureter using one of those stiff catheters. The patient had a stone in the ureter and I was attempting to pass the catheter beyond it. I don't think I have ever been accused of being rough in cystoscopic manipulations but I certainly did not use any excessive force in this case. Perhaps the pressure of a stone produces spots of necrosis or chronic inflammatory reaction and hence the ureter is much more susceptible to damage than otherwise. Dr. O'Conor some years ago suggested the use of prostigmine and reported good results by injecting prostigmine. My results, unfortunately, have not paralleled his. The most important factor, except the damage that may occur, is that one must be sure of the kidney function. If one can get a catheter by the side of the stone, it is much safer to leave the catheter in and drain the kidney rather than try to tie loops in it and pull the stone down. If one pulls on a stone one is apt to tear the ureter or damage its mucosa, irrespective of the experiments on dogs. Spinal anesthesia is another thing that one must be particularly careful of in handling these cases. There is no doubt that it causes relaxation, but it also stops the pain and therefore as my patient did not feel any pain and did not realize perhaps that I was using more force, I was able to push a catheter through the ureter. So please let's get away from intraureteral manipulation with other than soft catheters, leave the catheter in to drain the kidney and promote the passage of the stone and watch the function of the kidney.

DR. HERMON C. BUMPUS JR., Pasadena, Calif.: Dr. Finney should be congratulated on having manipulated 50 stones and encountered serious difficulty only once. This is an unusual record, for in the manipulation of ureteral stones one has the condition of urinary obstruction associated with infection, a combination that can result in the most serious of consequences. Dr. Livermore has emphasized the dangers of rupturing the ureter. I would emphasize those of infection in the presence of obstruction. Severe febrile reaction under these circumstances is likely to occur rapidly as a result of renal involvement, and septicemia not infrequently follows. For this reason it would seem imperative that one should inform the patient of these dangers before attempting manipulation and obtain his permission to resort to the surgical removal of the stone immediately if such untoward symptoms develop.

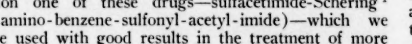
DR. ROY PELHAM FINNEY, Spartanburg, S. C.: I have to submit to authority in these cases, because you gentlemen have been practicing urology a great deal longer than I have. I did the first few operations with fear and trembling. I would not have undertaken the procedure had it not been for the fact that one gets tired of seeing certain patients once a week and over and over again subjecting them to the pain of "transurethral manipulation." This high sounding term too often means poking and prodding the stone at random. I thought that my loop around the stone would produce an obstruction and acute hydronephrosis. To my surprise, none of these cases showed any evidence of obstruction, save 1. On the contrary, the pain in the back was relieved as soon as the loop engaged the stone. This is not remarkable, since the loop acts as a dilator, keeping the walls of the ureter away from the stone. In the 1 case obstruction was complete. Relief, however, was easily obtained when I succeeded in passing a catheter to the renal pelvis without disturbing the loop. When possible I think it is well to do this at the time the loop is applied. I have used Dr. Livermore's instrument. I believe I have tried every instrument that has been devised for extracting ureteral stone. Perhaps I like this one better because it is mine. At any rate, it does work well and I did not get into any trouble in 50 cases. Now and then one may find it impossible to extract either the stone or the loop. What of it? One may be sure that a stone so tightly embedded will respond to nothing short of open operation. One operates. A pleasant surprise awaits you when beginning to feel for the stone The loop will take one directly to it, especially if an assistant pulls a bit on the distal end.

THE USE OF SULFACETIMIDE IN BACILLARY INFECTIONS OF THE URINARY TRACT

FERDINAND WELEBIR, M.D.
AND
ROGER W. BARNES, M.D.
LOS ANGELES

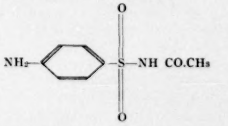
Recent advances in chemotherapy have been of great benefit in the treatment of infections of the urinary tract. Research in chemotherapeutic agents, especially the sulfonamide compounds, is progressing rapidly. It has been our privilege to have under clinical investigation one of these drugs—sulfacetimide-Schering [1] (*p*-amino-benzene-sulfonyl-acetyl-imide)—which we have used with good results in the treatment of more than 200 cases of infections of the urinary tract due to the colon-aerogenes group of organisms.

In the vast amount of experimental work on sulfanilamide, it was found that it was acetylated in its passage through the body. This acetylation occurs at the amino group in the para position. Vonkennel and Korth [2] found that sulfanilamide when acetylated at this particular position became nontoxic but completely lost its therapeutic value.



Sulfanilamide. P-acetyl-amino-benzene-sulfonamide.

In an effort to develop a compound which would still be relatively nontoxic yet hold its therapeutic effectiveness in the body, Dohrn and Diedrich [3] succeeded in removing one of the hydrogen atoms of the sulfonamide group and placing the acetyl group in this position. The structural formula is:



This new compound has been used extensively in the British Empire and in Europe under the name "Albucid"; in the United States it has been under clinical investigation under the name "Sulamyd" (provisionally designated as preparation 338-A). It is supplied in tablets of 0.5 Gm. each.

As with sulfanilamide, the blood concentration and the elimination depend on the solubility and absorption of the compound from the gastrointestinal tract. Sulfacetimide has weakly acid properties owing to the hydrogen of the imido group as a result of acetylation in this position. Consequently, it readily forms easily soluble salts with the alkalis and, therefore, is rapidly absorbed from the gastrointestinal tract. It was found by Karbe [4] that the average blood concentration during the course of administration (4.5 Gm. a day) was 3.1 mg. per hundred cubic centimeters and that there was complete elimination of the compound six days after the last dose had been taken. Gertler,[5] in his determinations, found that the blood concentration reached a maximum of 7.9 to 8.1 mg. per hundred cubic centimeters two hours after the oral administration of a single dose of 4 Gm. of the compound. A slight increase in the blood concentration could be expected during the administration of further doses; but after the drug was discontinued there was a rapid drop in the blood concentration, so that on the third day only traces could be found.

It is eliminated, in a large part unchanged, by way of the kidneys. Kidney function has a bearing on the elimination curve. Gertler reports a steep drop in the elimination curve only after discontinuance of the compound and that by the sixth day after the last dose has been taken the body is practically free of the sulfacetimide, except for possible traces on the seventh day. Dohrn and Diedrich found that approximately two thirds of the absorbed drug appears unchanged in the urine. This possibly accounts for the rapidity with which gram-negative bacilli are found to disappear from the urine.

In our clinical investigation we have used sulfacetimide only in the bacillary group of infections of the urinary tract. Each case presented gram-negative bacilli demonstrated in the urine either by stain or by culture. No value was placed on the p_H of the urine, as we found that sulfacetimide was as effective in acid as in alkaline urines. At first the course of treatment consisted of 34 0.5 Gm. tablets given in the following manner: 2 tablets after meals three times a day for three days, then 1 tablet after meals three times a day for two days and ending the course with 1 tablet twice a day for five days. The course lasted ten days. Later we found that a course of 15 Gm. was as effective in the large majority of cases; therefore, those treated toward the end of the series received the reduced dosage. In some cases in which a few bacteria persisted in the urine or recurred, smaller doses were continued over a longer period of time.

Gram stains or cultures and routine urinalyses were done every three or four days after the onset of treatment. This was carried out until from two to five or more negative stains or cultures were obtained. In ten cases frequent determinations of the blood count and hemoglobin changes during sulfacetimide therapy were made (table 1). In 1 case in this group side actions were complained of and in 2 other cases a prolonged term of therapy was required. We observed no tendency to leukopenia or other blood changes in our cases under treatment with sulfacetimide. In cases in which there was a leukocytosis from the infection preceding administration of sulfacetimide we noted a reduction to a relatively stationary level, and this continued throughout the course of treatment.

This report covers a series of 200 cases. Fifty-four additional dispensary cases in which initial complaints were limited to the bladder are not reported, for in these cases the patient failed to return after receiving the tablets; and it is probable that most of them received sufficient relief from their symptoms to make them feel that there was no need for further treatment. The drug was given each patient when gram-negative bacilli were found in the urine. Cystoscopy and a study of the kidney were done on the patients whose

From the Department of Urology, College of Medical Evangelists.
Read before the Section on Urology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 6, 1941.

1. The drug used for this study was supplied by the Medical Research Division, Schering Corporation, Bloomfield, N. J.
2. Vonkennel and Korth: Zur Chemotherapie der Gonorrhoe mit "Albucid," München. med. Wchnschr. **85**: 2018 (Dec. 30) 1938.
3. Dohrn, M., and Diedrich, P.: Albucid, ein neues Sulfanilsäurederivat, München. med. Wchnschr. **85**: 2017 (Dec. 30) 1938.
4. Karbe, P.: Die Sulfonamidderivat: Ihr Verhalten im Körper, Blutspiegel und Ausscheidung in Harn, unter besonder Berücksichtigung des Paraaminobensolsulfonacetylamide (Albucid), Arch. f. Dermat. u. Syph. **178**: 742, 1939.
5. Gertler, W.: Untersuchungen über die Höhe des Albucidblut- und Harnspiegels nach Albucidverabreichung bei Gonorrhöe und deren Bedeutung für den Heilerfolg, Klin. Wchnschr. **18**: 1089 (Aug. 12) 1939.

presenting symptoms suggested an obstructive uropathy and those in whom the infection persisted while the drug was being administered, or recurred after it was discontinued.

The patients were divided into two groups: (1) those who complained of bladder symptoms only and presented no definite evidence of other disorder and (2) those in whom a pathologic condition in addition to an infection of the bladder was demonstrated. The patients listed in table 2 are those included in the first group. Many of them probably had a low grade infection of the upper urinary tract. With a few exceptions, the patients who are classified as "recovered" received only one course of treatment, whereas those who are classified as "improved" or "unimproved" required repeated courses or continuation of small doses of the drug to prevent recurrence. It may thus be concluded that if recovery is to occur in a patient placed on this form of treatment, the first Gram stain taken three or four days after the onset of administration of the drug will give a relatively accurate prognosis. Some patients tolerated only small amounts of the compound yet recovered on these smaller doses. The average dose for recovery was 17.4 Gm., the maximum dose 40.75 Gm. and the minimum dose 4.75 Gm. The average number of days required for recovery was ten and two-tenths, the maximum twenty-seven and five-tenths and the minimum five days.

TABLE 1.—*Blood Counts*

Case	Hemoglobin, Percentage	Red Blood Cells	White Blood Cells	Differential: Polymorphonuclears, per Cent	Differential: Lymphocytes, per Cent	Differential: Other Cells, per Cent
1 Acute pyelonephritis and cystitis	84*	4,880,000	19,000	91	5	4
	91	5,020,000	15,900	91	5	4
	91	5,020,000	11,400	83	9	8
	91	5,040,000	10,950	73	15	12
	91	5,110,000	11,200	76	22	2
2 Acute pyelonephritis and cystitis	70*	3,350,000	20,150	84	11	5
	66	3,440,000	13,550	83	16	1
	70	3,580,000	11,500	87	7	6
	68	3,600,000	13,050	86	13	1
3 Chronic pyelonephritis and cystitis	86*	4,830,000	5,500	63	37	..
	88	4,280,000	5,250	62	..	..
	90	5,010,000	4,500	61	..	..
	90	4,980,000	4,600	..	..	..
	80	4,290,000	5,000	..	..	..
	77	4,830,000	5,300	..	..	..

* Before therapy.

TABLE 2.—*Acute and Chronic Cystitis (No Evidence of Other Disorder): Ninety-Five Cases*

	Acute Cystitis 40 Cases: Number	Acute Cystitis 40 Cases: Per Cent	Chronic Cystitis (to 30 Years) 55 Cases: Number	Chronic Cystitis (to 30 Years) 55 Cases: Per Cent	Total 95 Cases *: Number	Total 95 Cases *: Per Cent
Results						
Recovered	37	92.5	50	90.9	87	91.5
Improved	3	7.5	4	7.27	7	7.5
Unimproved	..	....	1	1.8	1	1.0
	Grams		Grams		Grams	
Total dosage						
Average	18.65		19.2		18.9	
Maximum	56.5		51.0		53.7	
Minimum	4.5		5.0		4.75	
Dosage in recovered cases						
Average	16.9		17.8		17.4	
Maximum	36.5		45.0		40.75	
Minimum	4.5		5.0		4.75	
	Days		Days		Days	
Total days treated						
Average	11.06		10.9		10.9	
Maximum	35.4		28.0		31.7	
Minimum	5.0		5.0		5.0	
Length of treatment in recovered cases						
Average	10.1		10.35		10.2	
Maximum	31.0		34.0		27.5	
Minimum	5.0		5.0		5.0	

* Reactions occurred in 3 cases.

Three side actions were noted during the administration of sulfacetimide in this group:

CASE 1.—A woman aged 32 complained of mild nausea, vomiting, dizziness, "inward trembling" and precordial palpitation, beginning four days after onset of therapy, a total of 10.5 Gm. having been given. The symptoms were so mild, however, that the drug was continued until she had taken 17 Gm. Immediately after completion of the course of treatment all symptoms disappeared, and on repeated Gram stain of catheterized specimens of urine no recurrence of the infecting bacilli was found.

CASE 2.—A woman aged 34 complained of a maculopapular itching rash covering the neck, chest and lower portion of the face which occurred on the second day of therapy after a total of 4 Gm. Medication was discontinued and the rash gradually improved and completely disappeared five days after its appearance. A similar reaction had been experienced with low sulfanilamide dosage. The urinary infection cleared up and subsequent specimens remained sterile.

TABLE 3.—*Cystitis with Complications: One Hundred and Five Cases* *

	Number	Per Cent
Results		
Recovered	84	80.0
Improved	18	17.1
Unimproved	3	2.8
	Grams	
Total dosage		
Average	27.8	
Maximum	80.0	
Minimum	8.0	
Dosage in recovered cases		
Average	28.1	
Maximum	52.0	
Minimum	8.0	
	Days	
Total days treated		
Average	15.2	
Maximum	80.0	
Minimum	4.0	
Length of treatment in recovered cases		
Average	11.7	
Maximum	34.0	
Minimum	4.0	

* Reactions occurred in 5 cases.

CASE 3.—A woman aged 62 noticed on the second day of therapy, after a total of 4 Gm., an itching erythematous rash which appeared on the face and arms and also was distributed irregularly over the body. The drug was discontinued, and there was complete disappearance of the rash in four days. Repeated Gram stains of urine specimens remained negative.

The second group (table 3) comprises 105 cases diagnosed as acute or chronic cystitis in which the pathologic condition producing the infection was definitely diagnosed. These complicating factors were acute or chronic pyelonephritis, hydronephrosis due to ureteral stricture, benign hypertrophy of the prostate, chronic prostatitis, ureteral and renal calculi; carcinoma of the prostate and pregnancy complicated by pyelonephritis. Of these, 84, or 80 per cent, recovered; 18, or 17.1 per cent, showed definite improvement, and 3, or 2.8 per cent, were not benefited by the drug. Five patients had reactions. The average dose for recovery was 28.1 Gm., the maximum 52 Gm. and the minimum 8 Gm. The average length of time before recovery occurred was eleven and seven-tenths days, the maximum thirty-four days and the minimum four days.

In this group of infections of the combined upper and lower urinary tract, 20 patients received renal pelvic lavage in conjunction with sulfacetimide orally. Fourteen, or 70 per cent, of these patients recovered and 6, or 30 per cent, showed improvement. A group of 48 similar patients with infection of both the upper and the lower urinary tract received no therapy except the oral administration of sulfacetimide. Of these, 36, or 75 per cent, recovered and 12, or 25 per cent, showed improvement.

The 5 cases of side actions which occurred in group 2 are as follows:

CASE 4.—A man aged 66 had a bladder infection after transurethral resection for benign hypertrophy of the prostate. The patient was greatly debilitated and was a poor surgical risk. A total of 65.5 Gm. of sulfacetimide was given over a period of eighteen days. Nine days after the first dose he complained of an increase in the pulse rate, pain and depression about the precordial area. The dose was reduced from 0.5 Gm. three times a day to 0.5 Gm. twice a day, which lessened the symptoms; two days after the last dose had been taken all symptoms of reaction disappeared. The patient complained of the same symptoms while he had been given sulfathiazole.

CASE 5.—A man aged 23 had pyelonephritis on the right side. The patient complained of nausea and palpitation when sulfanilamide was administered. He was started on 0.5 Gm. of sulfacetimide four times a day, and after he had taken it four days he complained of mild nausea and palpitation. The drug was discontinued and two days later there were no signs of reaction. He recovered from the infection and has remained well without further treatment.

CASE 6.—A woman aged 55 had infected hydronephrosis and cystitis. The patient had previously complained of nervousness, palpitation and malaise when sulfanilamide and sulfathiazole were administered. With the administration of the mandelates a rash developed. Four days after starting sulfacetimide she complained of nervousness and palpitation. She had taken 8 Gm. during this time, and the dosage was then reduced to 1 Gm. daily. The palpitation disappeared and there was a striking decrease of the nervousness. The patient continued therapy until there was a distinct improvement.

CASE 7.—A woman aged 39 had chronic cystitis and chronic pyelonephritis. Five days after the first dose of sulfacetimide, and after she took a total of 12 Gm., a mild erythematous rash developed on the trunk and feet. The drug was discontinued and five days later there was no evidence of the rash. The course was repeated in smaller doses, but the rash immediately reappeared in the same areas. There was complete disappearance of the rash three days after the last dose had been taken.

Case 8 is reported in detail because of its interesting character:

CASE 8.—A man aged 34, with chronic pyelonephritis and chronic cystitis due to renal and ureteral calculi, had had severe reactions following the oral administration of sulfanilamide, the chief manifestation being a rash. The dosage was reduced but the rash would persistently reappear, no matter how small the amount given. He was then placed on a course of sulfacetimide. A two week rest period followed; during this time there was a constant shower of gram-negative bacilli in the urine and a recurrence of the costovertebral pain and symptoms of cystitis. At the end of this period he was started on a second course. On the second day he complained of mild cyanosis, dyspnea, general malaise and rash about the corona of the glans penis. The medication was discontinued and five days later there was no sign of the reaction.

The urine became crystal clear during administration of the sulfacetimide, and there was no evidence of the infecting bacilli. Immediately after discontinuance of the drug the urine became cloudy, and gram-negative bacilli were found.

A few days after all signs of the reaction had disappeared, the patient was placed on 0.125 Gm. twice a day. There was immediate and absolute relief from all symptoms, and the urine immediately became clear and sterile. The dosage was then increased to 0.25 Gm. twice a day, whereupon the entire group of symptoms reappeared and the former reaction recurred. The dosage was again lowered to ¼ tablet twice a day and the patient was without symptoms. After two months of the smaller dosage all medication was discontinued, and repeated examinations of the urine have shown no evidence of the previous infection, either by Gram stain or on culture.

TABLE 4.—*Reactions*

Case	Sex	Age	Diagnosis	Grams Taken Before Reaction	Day Reaction Was First Observed	Total Grams Taken	Total Days Treated	Reaction	Comment
1	♀	32	Acute cystitis	10.5	4	17	5	Nausea, vomiting, dizziness, palpitation	Medication discontinued; reaction disappeared
2	♂	66	Chronic cystitis, benign prostatic hypertrophy, chronic prostatitis	16.5	8	26.5	18	Increased pulse rate, pain and precordial depression	Reaction disappeared when medication was discontinued; similar reaction with sulfathiazole
3	♀	23	Right pyelonephritis	8	4	8	4	Nausea, palpitation	Reaction disappeared two days after medication was discontinued
4	♀	39	Chronic cystitis and pyelonephritis	12	5	13	7	Erythematous rash on trunk and feet	Medication discontinued; rash disappeared five days later
5	♀	55	Cystitis, hydronephrosis	8	4	80	80	Nervousness, palpitation	Dosage reduced to b. i. d. caused less nervousness, medication continued until patient improved
6	♂	34	Ureteral calculus, chronic pyelonephritis	6	2	21.5	34	Mild cyanosis, dyspnea and malaise	Dosage reduced; reaction disappeared
7	♀	34	Chronic cystitis	4	4	4	2	Maculopapular itching rash on feet, neck and chest	Disappeared five days after medication discontinued; had same type rash with sulfanilamide; recovered from cystitis
8	♀	62	Chronic cystitis	4	2	4	2	Erythematous rash on face, arms and body patches	Medication discontinued; rash disappeared four days later; recovered from cystitis

In the entire series of 200 cases, we had 8 instances, or 4 per cent, of side actions (table 4). Five, or 62.5 per cent, had similar side actions with sulfanilamide or sulfathiazole. One patient noticed the first signs of reaction on the eighth day, after a total of 16.5 Gm. In 4 cases the reaction appeared on the fourth day, in 1 case on the fifth and in 2 cases on the second day. The average time before symptoms appeared was four and one-tenth days. The average amount of drug given before the reaction appeared was 10 Gm. One patient had neuritic symptoms with sulfanilamide, but when

medication was changed to sulfacetimide she had none. Three patients could not tolerate either sulfanilamide or sulfathiazole but had no ill effects from sulfacetimide.

Seven patients with acute pyelonephritis of pregnancy were treated. All were given an eight day course of 30 tablets (15 Gm.). In each case the urine became sterile three days after treatment was started, and after the course was finished the patients required no repetition of sulfacetimide. Chills, fever and pain disappeared immediately after the first day. Repeat stains of urinary sediment have all been negative, and deliveries have been uncomplicated. Two other patients treated post partum, and 1 after cesarean section, recovered.

Three children are included in this series. One child aged 5 years had been treated with mandelates, sulfanilamide and intramuscular azosulfamide with no reduction of the temperature nor elimination of the chills and fever. A dose of 0.25 Gm. of sulfacetimide was given twice a day for two days, and the course was completed with 0.25 Gm. once a day for five days. The chills, fever and costovertebral pain disappeared on the third day. The urine became sterile—after having had many pus cells and gram-negative bacilli for four months—and remained sterile on repeated examinations over a period of nine consecutive months. Two patients, each 10 years of age, recovered from acute attacks of infection of the lower part of the urinary tract with the administration of sulfacetimide and have been without symptoms for eight months.

In this group of 200 patients we found that 21 had been on sulfanilamide before sulfacetimide was given. Sulfanilamide was discontinued, either because of no response to the drug or because of reactions. After treatment with sulfacetimide, 17 patients were classed as recovered, 3 showed improvement and 1 did not respond. This is an 80.9 per cent improvement over sulfanilamide. Eleven patients who did not respond to the mandelates recovered with sulfacetimide, while 4 did not respond—a 73.3 per cent improvement over the mandelates. Three patients who did not respond to azosulfamide recovered on sulfacetimide therapy.

TABLE 5.—*Summary*

	Number	Per Cent
Total number of cases	200	100.0
Recovered	171	85.5
Improved	25	12.5
Unimproved	4	2.0
Reactions	8	4.0

Six patients had previous sulfathiazole therapy: 2 could not tolerate it and 4 did not respond to it. These 6 patients recovered when placed on sulfacetimide therapy. Nine other patients who had taken some other form of oral therapy without response recovered when placed on sulfacetimide therapy.

SUMMARY

Two hundred cases of bacillary infection of the urinary tract were treated with sulfacetimide. The percentage of recoveries was 85.5; 12.5 per cent showed improvement and 2 per cent showed no response to the drug.

Sulfacetimide has been more effective in the treatment of these infections of the urinary tract than has sulfanilamide and the mandelates. In 80.9 per cent of the sulfanilamide-resistant cases recovery occurred when sulfacetimide was given; in 73.3 per cent of the mandelate-resistant cases and in all of the sulfathiazole-resistant cases recovery occurred.

There were toxic reactions in 4 per cent of patients in this series. After discontinuance of the drug, the reaction disappeared within a period of from one to six days.

The results of this clinical investigation show that sulfacetimide is effective and superior to other sulfonamides in the treatment of bacillary infections of the urinary tract.

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THE CHEMOTHERAPY OF GONORRHEAL URETHRITIS IN THE MALE

WILLIAM BROMME, M.D.
DETROIT

No group of therapeutic substances has gained such rapid and universal utilization as have the sulfonamides. It is undoubted that their advent has been the important therapeutic accession of the decade and that the control of many diseases caused by infectious agents now has been brought within the physician's grasp. It is equally true that there has developed a degree of uncertainty relative to the specific indications for the use of the sulfonamides, and in no part of the literature is this more evident than in the discussions of the treatment of gonococcic infection in the male.

Before the advent of the sulfonamides, how was gonorrhea cured? A host of chemicals and dyestuffs was given orally, first one and then another when the first seemed not to accomplish the desired result. A veritable flood of colored solutions was instilled onto the urethral mucosa or washed over its surface. Various vaccines were prepared from laboratory culture of strains of the organism. The human body containing the organism was exposed to high temperature. And time itself often cured the disease in those who put not their faith in doctors.

There is evident the same confusion today. There is one group of observers [1] which believes that sole reliance should not be placed on the sulfonamides but that the therapies once considered curative in themselves should be supplemented by the cautious use of these newer chemicals: this point of view bears consideration because of the extravagant claims proposed for other drugs which did not bear the test of time. A second group [2] holds that the risk of toxic symptoms from the use of the sulfonamides exceeds any possible benefit to be gained from them. The third, and by far the largest group,[3] has observed the phenomenal and rapid cure of gonorrhea when the sulfonamides alone have been used, and series with cure rates as high as 96 per cent have been presented in evidence.

Read before the Section on Urology at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 6, 1941.

1. Kendell, H. W.; Rose, D. L., and Simpson, W. M.: Combined Artificial Fever: Chemotherapy in Gonococcic Infections Resistant to Chemotherapy, J. A. M. A. **116:** 357 (Feb. 1) 1941. Pelouze, P. S.: Gonorrhea in the Male, ibid. **114:** 1878 (May 11) 1940. Pelouze, P. S., Chairman, and others: Gonorrhea in the Male, ibid. **115:** 1630 (Nov. 9) 1940. Ballenger, E. G., in discussion in Symposium on Sulfanilamide, J. Urol. **41:** 69 (Jan.) 1939; Wolbarst, A. L., ibid., p. 72. Colston, J. A. C., ibid. p. 73.

2. Weisstub, Irvin: Canad. M. A. J. **40:** 389 (April) 1939.

3. Culp, O. S.: Treatment of Gonorrhea with Sulfathiazole, J. Urol. **44:** 367 (Sept.) 1940. Burkholder, T. M., and Bang, Frederik: Use of Sulfathiazole and Sulfamethylthiazole in Treatment of Gonorrheal Urethritis, ibid. **44:** 541 (Oct.) 1940. Knight, F.; Uhle, C. A. W., and LaTowsky, L. W.: The Treatment of Gonorrheal Urethritis in the Male with Sulfathiazole, ibid. **44:** 748 (Dec.) 1940. Van Slyke, C. J.; Wolcott, R. R., and Mahoney, J. F.: The Chemotherapy of Gonococcic Infections, J. A. M. A. **116:** 276 (Jan. 25) 1941. Greig, C. H.; Uren, J. L., and Mitchell, D. R.: Sulfathiazole Therapy of Gonorrhea, Canad. M. A. J. **44:** 237 (March) 1941. Diagnosis and Treatment of the Venereal Diseases, Circular Letter No. 18, Medical Preparedness, J. A. M. A. **116:** 2405 (May 24) 1941.

Pelouze [4] recognized this uncertainty, and his statements made in 1928 are still valid:

A study of the disease gonorrhea will show that from the standpoint of pathology it holds a rather unique position among diseases. In other diseased conditions the question of pathology has held a large part of the field, so that before one considered the disease itself, he spent much time upon the pathology of it. With gonorrhea it has been entirely different. Though the pathologic picture has been a well completed one for at least twenty-five years, it has been lost sight of almost entirely in our considerations. Such a state is hard to understand, for there is no disease that can vie with gonorrhea in the survival of things which should have disappeared from its literature. No group of writers has been followed longer than those who early wrote upon gonorrhea. Indeed, it might be said with much truth that, if our grandfathers and possibly great grandfathers in medicine could come back and read what we have to say regarding the disease today, they would feel much at home. They would be little surprised over what we have added to their store of knowledge. Indeed, they would probably say that we have added little and lost much.

It seems well to review the nature and extent of the infectious process in the urethral wall:

The weight of evidence apparently shows that the mode of extension of the disease is by the surface progression of gonococci and not by subsurface transmission. Though it is a disease of surface penetration, it is apparent that this occurs perpendicularly to the surface. The bacteria pass between the epithelial cells into the submucosa, often as deeply as the trabeculae of the corpus spongiosum. . . . The speed of the penetration is great, so that by the end of thirty-six hours, they are well in the deeper submucosal spaces.[5]

In other words, this is a disease of the total urethral wall and not of the urethral surface. There is remarkably little evidence that any substance instilled onto the urethral mucosa ever cured gonorrhea except as an accessory to time or through nonspecific chemical stimulation. One recalls the classic report [6] of the series in which a solution of tincture of capsicum was compared favorably with a 5 per cent solution of silver nucleinate: "The results were equally as good in this group of patients as were those obtainable in a like class of patients by the use of any germicide."

Neither in those days nor in this day can the surface application of an antiseptic to the urethra be considered curative. It seemed to me that valuable experience and perhaps a valid conclusion could be drawn from the exclusive oral use of one of the sulfonamides. To that end this series of 100 cases was prepared and is presented herewith.

DRUG USED

Sulfathiazole (2-sulfanilamido-thiazole) was the sulfonamide used in this series. It appeared to be the derivative of choice in the treatment of gonococcic urethritis in the male [7] on the basis of lessened risk of toxic reaction and high therapeutic efficiency, although the more recent pyrimidine substitution form sulfadiazine may prove to be equally efficient.[8]

AGE AND OCCUPATION OF PATIENT

The average age of the group of 100 patients was 28 years. The oldest was 46 and the youngest was 22.

These men were employed in the heavy industries in which the expenditure of physical energy is great. It was desirable that none lose time from their work because of intercurrent infection.

PREVIOUS INFECTION

Forty per cent of the series had experienced one or more previous attacks of gonococcic infection. This factor is noted in an attempt to discover whether or not there remained any point in following the dictum that one attack so changes the epithelial character of the urethra that subsequent attacks bear a different clinical pattern. No such correlation was observed.

ONSET OF SYMPTOMS

The evidence of urethral irritation appeared uniformly four days after exposure. This is the general incubation period for the common strains of the organism. The fact that 36 per cent of the series had used samples of the host of commercial prophylactics and yet contracted the infection defies critical analysis.

PREVIOUS SULFONAMIDE THERAPY

Thirty-six per cent of the group had received treatment with sulfanilamide before they became part of this series. The dose of sulfanilamide had ranged from 1 to 3 Gm. daily and had been continued from seven to forty-nine days without alteration of the clinical evidence of the disease. The total dose of sulfanilamide involved ranged from 9 to 49 Gm.

CRITERIA OF INFECTION

In every case there was present a urethral discharge in an inflamed, edematous urethral canal. Stain of the urethral discharge revealed gram-negative intracellular diplococci in all cases. The first glass of urine was cloudy or turbid in all cases. The second glass of urine was cloudy or hazy in 70 per cent, indicating, traditionally at least, posterior urethral involvement. All were cases technically of acute gonococcic urethritis. The prostatic fluid presented a significantly increased cell count in 35 per cent of the cases, and the organism was identified in smears of the prostatic fluid in 15 per cent of the total series.

DOSAGE OF SULFATHIAZOLE

The total initial daily dose varied between 3 and 7 Gm., the average approximating 4 Gm., which was the actual daily dose for most of the series. This daily dose of 4 Gm. was divided in four parts and given at approximately equal intervals during the hours of the patient's activity. This dosage was maintained from two to eight days, the average being somewhat less than five days until cure was attained, although the same dosage was maintained from one to two days after evidence of the disease had disappeared. The average total dose for this period was 18.4 Gm.

Forty per cent of the series required no further sulfathiazole because smears had become negative within

4. Pelouze, P. S.: Gonococcal Urethritis in the Male, ed. 1, Philadelphia, W. B. Saunders Company, 1928, p. 64.
5. Pelouze: Gonococcal Urethritis in the Male, page 67.
6. Pelouze: Gonococcal Urethritis in the Male, page 137.
7. Long, P. H.; Haviland, J. W.; Edwards, Lydia B., and Bliss, Eleanor A.: The Toxic Manifestations of Sulfanilamide and Its Derivatives, J. A. M. A. **115:** 364 (Aug. 3) 1940. Lloyd, V. E., and Erskine, David: Treatment of Gonorrhea, Lancet **2:** 186 (Aug. 17) 1940. Mahoney, J. F.; Wolcott, R. R., and Van Slyke, C. J.: Sulfamethylthiazole and Sulfathiazole Therapy of Gonococcal Infections, Am. J. Syph., Gonor. & Ven. Dis. **24:** 613 (Sept.) 1940. Spink, W. W., and Hansen, Arild: Sulfathiazole: Clinical Evaluation, J. A. M. A. **115:** 840 (Sept. 7) 1940. Carroll, Grayson; Kappel, Louis, and Lewis, Bransford: Sulfathiazole: Clinical Investigations, ibid. **115:** 1350 (Oct. 19) 1940. Barlow, O. W., and Climenko, D. R.: Studies on the Pharmacology of Sulfapyridine and Sulfathiazole, ibid. **116:** 282 (Jan. 25) 1941. Flippin, H. F.; Reinhold, J. G., and Schwartz, Leon: Sulfapyridine and Sulfathiazole Therapy in Pneumococcic Pneumonia, ibid. **116:** 683 (Feb. 22) 1941. Strauss, Elias; Lowell, F. C.; Taylor, F. H. L., and Finland, Max: Observations on the Excretion and Distribution of Sulfanilamide, Sulfapyridine, Sulfathiazole and Sulfamethylthiazole, Ann. Int. Med. **14:** 1360 (Feb.) 1941. Stockwell, Lloyd: Experiences with Sulfathiazole in the Treatment of Gonorrhea in the Male, J. Urol. **45:** 636 (April) 1941.

8. Long, P. H.; Marshall, E. K., and Janeway, C. A.: Sulfanilamide and Related Compounds: Panel Discussion, Twenty-Fifth Annual session, American College of Physicians, Boston, April 23, 1941.

this period and had remained negative for a thirty day period of observation following the first negative smear. On the average, negative smears were obtained within three days on 4 Gm. daily.

Sixty per cent of the series required further doses of sulfathiazole for cure, and the average additional amount of the drug was 8.2 Gm., which represents slightly more than two days of additional medication. One half of this group represented patients who had received sulfanilamide previously. The smallest dose of sulfathiazole received by any patient was 9 Gm. and the largest 33 Gm.

CRITERIA OF CURE

The diagnosis of cure was based on (1) inability to find a urethral discharge for staining purposes and (2) persistently negative culture of the urine in the face of traditionally provocative tests. In all cases the ingestion of alcohol was utilized as a provocative measure and, in quite a number, protected coitus (and I suppose in a certain number unprotected coitus). In a few instances a steel sound was passed, but in no instance was an irritating chemical instilled into the urethra. The utilization of these traumatizing procedures is a part of the historical past of the treatment of gonococcic infection in the male.

RESULTS

The period of actual therapy and close observation included a period of three to thirteen days, and in this time 100 per cent of the series was cured. All were observed for an additional thirty day period. There was no increased period of treatment for those who had previously had a gonococcic infection. The 36 per cent who had previously received sulfanilamide and were transferred to sulfathiazole without a waiting period were cured with the same average amount of sulfathiazole and within the same period as those who had had no experience previously with the sulfonamides. There were no incapacitating reactions and no complicating sequelae of the disease.

COMPLICATIONS

The complications observed in the modern management of acute gonococcic infection in the male are of two types. The first derives from the tendency of the disease to spread centrally to involve the prostatic urethra, prostate gland, seminal vesicles, vasa, epididymides and the deeper para-urethral structures. This tendency is an inherent one in the disease; it can occur spontaneously but it has been demonstrated repeatedly to occur more frequently when the pressure of retrogradely injected material exceeded the ability of the tissues to oppose that force. Since no local medication was utilized in this series, and since the organism had disappeared in a reasonably short period of time, it was not at all surprising to find that there were no local complications of the disease and no reason to anticipate the development of stricture in the future. Three patients (3 per cent) presented prostatic fluid cell counts in excess of the normal range, but culture of the fluid was negative for gonococci one month after the patient had been declared cured by standard criteria. I am not certain that these patients had not possessed a nonspecific prostatitis antecedent to their acute gonorrhea. At all events, they did not have a gonorrheal prostatitis. There were no complications involving hematogenous spread of the organism.

There is a second series of complications related to the administration of the drug. The literature has described dermatitis,[9] nausea, vomiting, headache, dizziness, hematuria, oliguria or anuria and anemia. These signs seem to be associated in variable degree with the administration of all sulfonamides. There seems to be no relation between either the dosage or the duration of treatment and the appearance of one or many of the toxic reactions to the drug used. In this series 23 per cent of the patients complained of variable nausea, but there was no vomiting. Five per cent manifested elevation of temperature with a recorded peak of 100.6 F.; these were all men who had received sulfanilamide previously, and the fever appeared toward the end of the course of intensive 4 Gm. daily of sulfathiazole. In 1 patient a diffuse, discrete, pruritic, papular cutaneous eruption developed which ultimately was demonstrated to be scabies. There were no instances of hematuria, oliguria, anuria or suggestion of tubular blockage by crystallization of the excretion product in the kidney. I had been influenced by the work of Curtis,[10] which suggested that a prime factor in the maintenance in solution of the excretion product was an alkaline urine and, accordingly, I ordered for the entire series the concurrent administration of a urinary alkalizer (a citrate) orally. Likewise, the experience of Wilson at the Children's Hospital of Michigan[11] with regard to maintenance of an adequate volume of fluid intake was accepted, and all in this series were urged to force fluids to capacity. Marshall[8] has noted that the urine of nearly every patient placed on sulfathiazole therapy will show quantities of crystals of acetylsulfathiazole if it is kept iced for four hours. I observed no crystallization in the freshly voided urine and felt that the combination of alkalized urine of moderate dilution was a safeguard against crystallization of the excretion product within renal tubules.

No patient lost time from work. A few noted transient headache but were not incapacitated by it.

COMMENT

This series did much to convince me that there has developed a needless confusion in the minds of those who treat acute gonococcic infection in the male. This might well be a time to revise the program of treatment to exclude those things which have been done traditionally and which apparently have no further justification for their perpetuation. With the advent of a series of drugs, of which sulfathiazole is the current example, which are in themselves capable of curing gonococcic infection, there seems to be little justification for the continued use of other routines in conjunction with the sulfonamides, especially when the time limit to achieve cure on sulfonamide therapy is infinitely shorter than with any other known therapeutic agent. Why must one run the rainbow of colors in dyestuffs and percentage strengths of silver proteinate in the archaic procedure of instillation onto the surface of the urethral mucosa when the active infection is far deeper than will ever be reached by this method? Why is this routine perpetuated which is not based, after all, on an understanding of the pathologic nature of the disease? One can filter into those tissues which harbor the gonococcus a medication which is lethal to it. Nesbit has shown that the action of the drug is

9. Volini, I. F.; Levitt, R. O., and O'Neil, H. B.: Cutaneous and Conjunctival Manifestations of Sulfathiazole Intoxication, J. A. M. A. **116**: 938 (March 8) 1941.
10. Curtis, A. C.: Personal communication to the author.
11. Wilson, James L.: Personal communication to the author.

in the tissues and not in the excretion products eliminated in the urine.[12]

The complications observed in this series were in no sense critical or disabling and offered no contraindication to continuation of therapy. The literature does report high temperature, extensive dermatitis, conjunctivitis and evidence of renal interference, and had these appeared in my series I probably would have discontinued the drug. But the weight of evidence is that these manifestations of intolerance by the patient come late in the course of protracted therapy.

I have a feeling that the dosage must be high from the start. There is no justification for a dosage schedule which tends to start at a low level and then builds up to what is known to be an adequate dose. If there is anything to the notion that organisms can become tolerant to a chemical so that they become resistant ultimately to its action, there is no better method of inducing this unfortunate state than by trying out inadequate doses initially. I suspect that what are called "sulfonamide-resistant" strains of organisms have become so by virtue of the use of too cautious dosage. As a matter of fact, the 36 per cent of this series who had been exposed to sulfanilamide without therapeutic response and were thus to be considered "sulfonamide resistant" were placed without a rest period on adequate doses of sulfathiazole and were cured at exactly the same rate and with the same average doses as those who had not received a sulfonamide previously. Thus I cannot take too seriously this matter of alleged induced resistance to the drug without wondering what might have happened if the dose of the drug had been within the range of actual therapeutic efficiency.

A word of comment is in order regarding the matter of the evaluation of the progress of therapy through repeated determinations of the blood level.[13] Through the first third of the series I studied examinations of the blood level only to find a wide variation in the reports. It soon became evident that I was not altering the dose of the drug in those whose blood level was lower or higher than the average. It became equally obvious that the interpretation of clinical conditions meant considerably more in the management of each case. There was no instance in which the summation of clinical signs proved undependable, and with the wealth of information to be gained from the study of the urethral discharge and the urine I abandoned further routine determinations of the blood level as a thoroughly unnecessary additional expense to the patient.

Finally, it must be remembered that there has always been a sharp increment in the incidence of the venereal infections with the congregation of large numbers of our youth in cantonments. Unlike 1917, the physician has at his disposal a drug which is a safe, speedy, nontraumatizing and certain treatment for gonococcic infection in the male. With this form of management of the infected, the physician's experience should be much happier than it was during the first World War.

CONCLUSIONS

1. Sulfathiazole is capable of curing gonococcic urethritis in the male quickly when administered orally in doses of 4 Gm. daily. This dosage should be continued for a time after there is clinical and bacteriologic evidence of cure.

2. On this dosage, the appearance of complications due to drug toxicity are rare and should not impel one to shun the drug.

3. The estimation of the blood level in the face of easily obtained clinical evidence is an unnecessary procedure.

4. Traditional adjuvant routines of therapy are not necessary.

613 Professional Building.

12. Nesbit, R. M.: Observations on the Site of Action of Sulfapyridine in Gonorrhea, J. Urol. **44**: 242 (Aug.) 1940.

13. Cook, E. N.: Chemotherapy in Urology, J. A. M. A. **115**: 2079 (Dec. 14) 1940.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. WELEBIR AND BARNES AND DR. BROMME

DR. EDWARD NOBLE COOK, Rochester, Minn.: I was impressed with the fact that the dosage used by Drs. Welebir and Barnes is not excessively high. Many of us found that the 75, 90, 120 and 150 grain (5, 6, 8 and 10 Gm.) doses daily were not necessary. Drs. Welebir and Barnes have found that a dosage of 20 to 30 or 40 grains (1.3, 2 or 2.6 Gm.) a day will take care of most of these infections. I have found that in the simple bacillary infections confined to the bladder the percentage cure rate is high. Even though the involvement may extend to the kidneys, provided there is not extensive pathologic change, the percentage cure rate is little changed. I might take exception to what Drs. Welebir and Barnes stated with regard to comparing sulfacetimide with mandelic acid or some of the other sulfanilamide compounds. All have had the experience in which we have used one or two courses of sulfanilamide and then given it a third time and, much to our surprise, eradicated the infection without a great deal of difficulty. I was interested in the fact that 70 per cent of Dr. Bromme's patients, when they first came to him, had posterior involvement. Yet the cure was just as high in this group as in the group without posterior involvement. He too has found that a medium sized dose is sufficient, that the 75 to 120 grain (5 to 8 Gm.) doses have not been necessary. In his series there have been no complications. In a small group of patients I have not seen complications. It is rare now to see a gonorrheal epididymitis or a periurethral abscess. The economic value of these drugs can only be estimated, but it must run into millions of dollars when one considers the time and the effort saved. Dr. Bromme has called attention to the importance of the clinical observation of the patient. I have found much the same thing. The blood concentrations aren't necessary; if one will see the patient every day or two one will not have to resort to all of these tests, which increase the cost of care to the patient and do little as far as his ultimate recovery is concerned.

DR. EDWIN PASCAL ALYEA, Durham, N. C.: In Dr. Bromme's paper one finds still another proof of the efficacy of sulfathiazole in the treatment of gonococcic infections. His cure rate is 100 per cent. I wish we had the "Detroit strain" of gonococcus in North Carolina. In 1937 it was shown that large doses of sulfonamide drugs and high blood concentrations were not necessary for a cure in gonorrhea. Since then this has been verified many times. Recently Mahoney reported a large series of cases treated with sulfathiazole; one group received 2 Gm. a day; another group received 4 Gm. a day; the cure rate, 90 per cent, was exactly the same in the two series. The adequacy of Dr. Bromme's therapy should be questioned. As is shown by his own series, 60 per cent of those stopped in forty-eight hours needed further treatment. I favor the following scheme of therapy: Three Gm. of sulfathiazole is given the first day and 2 Gm. a day thereafter for nine days. If, after the fourth day, there is no response, the drug is switched to similar doses of sulfapyridine. This is given for seven days. If there is no response to sulfapyridine in four days, switch to sulfanilamide or discontinue sulfonamide therapy. As to criteria for cure, in addition to Dr. Bromme's recommendations I think it is necessary that prostatic cultures be made every two weeks until at least four negative cultures for gonococci are obtained. In addition to this, patients should have the "probable cure"; namely, (1) no urethral discharge for two months; (2) four

prostatic secretions, examined one week apart, to have not more than ten leukocytes per high power field, and stained smear negative for gonococci; (3) four urine specimens one week apart, first glass clear, no leukocytes in centrifuged microscopic test and no gonococci in the stained smear. Drs. Welebir and Barnes state that in the complicated cases the dosage must be raised for cures. My associates and I did not find that such augmentation, in the case of the other sulfonamide drugs, increased our cures. If the complication present was not first treated, they have indeed a high percentage of cures, 80 per cent, much higher than we and others have obtained with any of the other sulfonamide drugs. As for the uncomplicated cases, their 91 per cent cures are slightly higher than we obtained with sulfapyridine for the treatment of colon bacillus infection, 88 per cent, and considerably higher than sulfathiazole, 77 per cent, and sulfanilamide, 80.6 per cent.

DR. W. RAY JONES, Seattle: There is a reason for the failure of sulfonamide therapy seldom considered; pus and exudate contain a substance which will neutralize the action of the drug in a greater concentration than it is possible to get the sulfonamides in solution. Hence, if there are focal abscesses, there must be recurrences when these open and drain. To illustrate, here in the gross is an infection of the paraurethral glands, the female prostate with a pouting meatus, and so on. This case developed during sulfonamide therapy for gonorrheal urethritis. The various crypts and follicles may become infected and a closed abscess result. The suburethral glands likewise may serve as foci to be uninfluenced by sulfonamide therapy until evacuated. My plea is to examine carefully for all possible nondraining infected areas before pronouncing the patient cured, else an unexplained recurrence will probably result due to infection of these various crypts and follicles.

DR. VICTOR D. LESPINASSE, Chicago: The highest possible concentration of drug should be obtained in the location where the bacteria are. The drug can be placed in the mouth or injected into the veins and it goes into the blood stream, but if it is injected into the urethra as well the drug will be on both sides of the organism. It surrounds the organism and engulfs the organisms in the urethral cavity. Nobody can deny that they are there; and there is no irritation from these drugs. My plea is to inject into the urethra as strong a solution of sulfathiazole or sulfanilamide as is possible to make in water in addition to use of the drug by mouth. I think that the results will be better than they are if one limits oneself to the use of the drug by mouth, subcutaneously or intravenously.

DR. WALTER M. SIMPSON, Dayton, Ohio: My associates and I have encountered an apparently irreducible residue of therapeutic failures, even with sulfathiazole. In our experience, based on rigid bacteriologic criteria, about 12 per cent of patients with gonococcic infection fail to respond successfully to presumably adequate sulfathiazole therapy. In a paper published in THE JOURNAL, February 1, we described a procedure directed toward the rapid elimination of such refractory gonococcic infections by the utilization of a single session of artificial fever combined with chemotherapy. It was found that any of the sulfonamide drugs (sulfanilamide, sulfapyridine, promin or sulfathiazole) given concurrently with therapeutic fever had no advantages over fever alone. We concluded that there is a latent period in the action of the sulfonamide compounds, the average of which is about eighteen hours. Therefore, in order to obtain the maximum response to the single fever treatment it is necessary to give the drug in reasonably high doses for eighteen hours prior to the fever session. In the report in THE JOURNAL we suggested a ten hour session of fever at 106.6 F. Our more recent studies, soon to be described in *War Medicine*, reveal that with sulfathiazole or promin given eighteen hours prior to a single fever session it is possible to reduce the number of hours of fever to eight and to reduce the rectal temperature level to 106 F. Thus far, such a combined program has resulted in 100 per cent elimination of the disease in chemoresistant cases. What was looked on as a technical feat a decade ago as regards the administration of fever therapy can now be prescribed with a regularity which approaches routine, owing to the remarkable improvements in the technics and in the apparatus for fever therapy. We are particularly interested in the relation of this procedure to military medicine. We feel that the stated mission of the United States Navy, "to keep as many men at as many guns as many days as possible," can be fulfilled as regards resistant gonococcic infections. The period of hospitalization necessary for this combined method of treatment is forty-eight hours. We feel, therefore, that if this procedure is surrounded by the necessary safeguards as regards well trained personnel and efficient apparatus it provides a simple, safe, cheap and certain method for the eradication of the gonococcic infections known to be refractory to the chemotherapeutic agents now available.

DR. ROGER W. BARNES, Los Angeles: As many urologists have probably used sulfacetimide, I wish to say a word to identify it more clearly. It is preparation 338-A, Schering, the chemical name which has been accepted being sulfacetimide. The term "Sulamyd" is Schering's trade name, and it was the Medical Research Division of Schering Corporation which supplied us with the drug we used. It is not as yet on the market because it has not been passed by the Food and Drug Administration, but it probably will be on the market in a few months. Of the eight reactions in this series of 200 cases, all were mild, and we did not have to hospitalize any patients with reactions. In 4 of them the drug was discontinued, and in 4 others, when the dosage was reduced, the reactions became less, so the medication was continued until the original infection was controlled. Dr. Alyea remarked on the higher percentage of recoveries which we reported from the use of this drug than he had obtained from other sulfonamides. I believe that all urologists will find this to be true when they use it in bacillary urinary tract infections. We found it to be less efficacious in clearing up coccic infections than sulfathiazole and sulfapyridine. In fact, in a number of cases in which there were mixed infections we found that the gram negative rods cleared up with the sulfacetimide, whereas the coccic infections did not. I believe that cystoscopy and a kidney study are not necessary in every case in which there is pus in the urine. Many of these cases will clear up without this manipulation, and in 95 of the cases in our series, studies of the upper urinary tract were not made. Only in the cases in which the infection persisted or recurred was more thorough study made. The cases in the second group, "cystitis with complications," included all in which there was another pathologic condition besides the infection. In these the complicating pathologic condition was treated while the drug was being given. The patients whose infection cleared up and who remained well after the drug was given and the complications removed were counted as recoveries, whereas if for some reason the complication could not be treated and the infection cleared up with the use of the drug but then recurred they were listed as improved. There were 12.5 per cent improved in this group and most of these cases were those in which the infection cleared up originally and then recurred after the medication was stopped.

DR. WILLIAM BROMME, Detroit: I think Dr. Cook and Dr. Alyea and I see eye to eye with regard to the premises that these drugs can kill the organism and that we no longer have to place medications in the urethra to cure the disease. But I do not believe the daily dosage of 3 Gm. is adequate. With that amount we shall see complications and a protracted clinical course. The dosage must be large from the start and kept large until there is bacteriologic evidence of cure. I am glad that Dr. Alyea repeated the necessity of meticulous supervision of details and bacteriologic control. I was much stimulated by Dr. Ray Jones's demonstration in the Scientific Exhibit. I see no gonorrhea in females, but I think we must assume from now on that, when glands do not drain and when periurethral abscesses form, something has gone wrong with our basic therapy. When we do not administer sufficient drug to overwhelm the organism we must anticipate the development of undrained areas which will require, as they have in the past, a mechanical method of drainage. Dr. Lespinasse's remarks about large doses is the bedrock of the whole story. No case in my series required fever therapy and I am unable to comment on Dr. Simpson's extensive experience with this adjuvant therapy. His dosage of sulfathiazole approximates the dosage which was curative in a large part of my series.

THE USE OF COTTON AS A SUTURE MATERIAL

WITH PARTICULAR REFERENCE TO ITS CLINICAL APPLICATION

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AND
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Fundamentally, surgeons are interested in methods and materials which lead to primary and early wound healing. Dissatisfaction with the results obtained with catgut as a suture material has led to a renewal of interest in nonabsorbable sutures during the past decade. After Bulloch and his co-workers [1] in Great Britain, Krönig [2] in Germany and Meleney and his associates [3] and Clock [4] in this country had demonstrated that catgut purchased on the open market was not infrequently contaminated, Whipple,[5] who had previously used catgut, strongly advocated the use of silk, with which he was able to show a reduced incidence of infections in clean wounds. This work gave a new impetus to the use of nonabsorbable suture material, a usage initiated in modern surgery by Halsted [6] and Kocher [7] at the end of the last century.

There exists venerable authority for the use of cotton as surgical sutures in Suśruta's recommendation of cotton for the suture of wounds of the abdomen and joints about 500 B. C. Gage [8] and Guerry [9] have employed fine cotton for ligatures on an empiric basis for many years. In 1939 Meade and Oschner,[10] in a previously reported exhaustive experimental study, demonstrated cotton suture material to incorporate the desirable qualities of pliability, satisfactory tensile strength, a high coefficient of friction, stability on exposure to heat or moisture and failure to produce tissue reaction. They undertook the comparative study of cotton, silk, linen and catgut with regard to tensile strength, tissue reaction, wound healing and bacterial contamination. Straight and knotted segments of these materials were tested before and after sterilization. Similar unreported studies were made with nylon. It was clearly demonstrated that whereas dry, unsterilized cotton has less tensile strength, size for size, than catgut, silk or linen, its tensile strength is less altered by sterilization than is that of other suture materials, and after implantation in the tissues it showed much less impairment of tensile strength than did any of the others. Furthermore, when placed in tissue cotton did not cause edema or allergic responses and stimulated less cellular tissue reaction than other suture materials. Apparently its compact structure prevented ingrowth of tissue and thereby lessened the incidence of suture sinuses, common with the use of silk. It was found that sinuses were much more frequent when continuous sutures were employed than when interrupted sutures were used, probably because infections were able to traverse the entire wound along the tract formed by the continuous suture. Cotton was easily sterilized by being boiled in water for twenty minutes or autoclaved for fifteen minutes at 15 pounds (6.8 Kg.) pressure.

The preparation of cotton for clinical use will be presented more fully in a subsequent paper. However, it should be emphasized that cotton should not be sterilized on rigid spools. As previously demonstrated by Meade and Ochsner, cotton contracts when heated, and if it is sterilized on a rigid spool the fibers are weakened or even ruptured, which materially decreases the tensile strength of the suture. The cotton suture should be rewound loosely on soft rubber tubing or should be rolled in small skeins of convenient size which can be placed in test tubes before sterilization.

Although we are convinced that cotton is tolerated better by tissues than silk and can be used more safely in the presence of gross contamination and infection, we are of the definite opinion that the tenets laid down by Halsted [6] for the use of silk should apply also to the use of cotton. Halsted emphasized that: (1) only interrupted sutures should be used, (2) coarse suture material should be avoided by the use of a greater number of finer suture materials, (3) a dead space should never be bridged over as a chord subtends an arc and (4) the combined use of absorbable and nonabsorbable material should be avoided.

We have employed cotton in all types of wounds requiring interrupted sutures. Catgut has been substituted only in the infrequent instances in which a continuous suture was found expedient in an effort to conserve time, viz. in peritonealization of the gallbladder bed, in closing of the pleural flaps over the pulmonary stump after a pneumonectomy or in the mucosal suture in an intestinal anastomosis. As indicated later, we have been particularly pleased with the results obtained in contaminated and infected wounds sutured with cotton. Ordinary spool cotton (six cord), which can be bought over the dry goods counter, has proved entirely satisfactory. Sizes 80 and 50 are of suitable caliber for ligation of small vessels. Quilting cotton is used for the ligation of larger vessels and for the suture of peritoneum, fascia and skin. Occasionally it is expedient to employ heavy (no. 5, 10 or 20) mercerized crochet cotton for the ligation of large vessels, such as the pulmonary artery and veins.

The handling of nonabsorbable sutures, whether silk or cotton, is at first difficult for surgeons trained with catgut. However, the original awkwardness is usually overcome after a month's consistent use of cotton, and the results obtained well justify the effort.

CLINICAL STUDIES

Because of the convincing results obtained by Meade and Ochsner in their experimental study of suture materials, cotton was adopted as the suture material

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Read before the Section on Surgery, General and Abdominal, at the Ninety-Second Annual Session of the American Medical Association, Cleveland, June 5, 1941.

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6. Halsted, W. S.: The Employment of Fine Silk in Preference to Catgut and the Advantages of Transfixing Tissues and Vessels in Controlling Hemorrhage, J. A. M. A. **60**: 1119 (April 12) 1913.

7. Kocher, T.: Zubereitung von antiseptischen Katgut, Centralbl. f. Chir. **8**: 353, 1881; Eine einfache Methode zur Erzeilung sicherer Asepsis, Cor.-Bl. f. schweiz. Aerzte **18**: 3, 1888.

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9. Guerry, Le Grand: Personal communication to the authors.

10. Meade, W. H., and Ochsner, Alton: Spool Cotton as a Suture Material, J. A. M. A. **113**: 2230 (Dec. 16) 1939; The Relative Value of Catgut, Silk, Linen and Cotton as Suture Materials, Surgery **7**: 485 (April) 1940.

of choice by most surgeons of the Tulane University surgical service at the Charity Hospital. Since its adoption late in 1939, it has been employed in approximately 1,800 operations in this institution. In addition to its use at Charity Hospital, it has been used routinely on

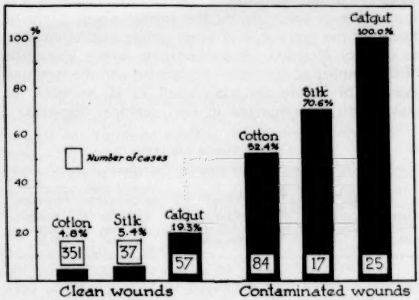

Fig. 1.—Percentage of complicated wounds in relation to type of suture material employed.

private patients by a number of senior members of the staff. The results obtained have appeared satisfactory to all the surgeons using cotton, even though most of those on the Tulane staff were trained in the use of catgut and later became convinced of the efficiency of silk. Since, in the absence of definite statistical data, impressions are known to be misleading, a factual study of wound healing was initiated on Dec. 1, 1940 under the direction of Dr. Alfred B. Longacre, director of the surgical bacteriologic research laboratories of the department of surgery of Tulane University. The figures incorporated in this report are used with his permission and will be published later in more complete detail.

METHODS

A tabular form was developed on which each wound could be classified. Spaces were allowed for the patient's name and hospital number and data on the operation, the surgeon and the types of suture material. Each wound was classified postoperatively as clean, contaminated or infected. By definition a clean wound was taken to be one made under surgical sepsis and not involving the opening of the gastrointestinal tract, the biliary tract, the genitourinary tract or infected tissue. In addition the wounds made by cholecystectomy for chronic cholecystitis in which choledochostomy was not performed and by appendectomy in the absence of acute infection were classified as clean wounds. Exceptions, which were classified as contaminated, were wounds requiring skin grafting for closure, wounds in which the skin was not closed, wounds made through a previously infected area and wounds which were grossly contaminated during the operation by a break in technic. Contaminated wounds were defined further as those not classified as clean in which the operative area did not contain gross infection, such as an abscess. Infected wounds were those made in an area showing gross evidence of bacterial invasion. During the postoperative hospital stay of each patient the wound was indicated to heal by first intention or to be complicated. Complications were listed as hematoma, wound necrosis, disruption, stitch abscess, trivial infection and serious infection. These terms were defined as follows: A hematoma is a sterile collection of whole blood, serum or plasma in or about the operative wound. Wound necrosis is necrosis of skin or subcutaneous tissues not the result of infection. Disruption is the spontaneous separation of any or all of the layers of the wound. A stitch abscess is any inflammatory or suppurative process about a skin suture or clip from which organisms can be cultured. A trivial infection is one which does not necessitate an increase in the expected length of hospitalization and which does not necessarily interfere with wound healing; a serious infection is one which interferes with wound healing or prolongs the period of hospitalization. An attempt was made to perform bacterial studies in every instance in which an infectious process was suspected; specimens for aerobic and anaerobic culture were collected from discharging wounds or by aspiration of collections of fluid. In addition the chart allowed space for information concerning the time of the first dressing, the time a complication was first noted and the condition of the wound on discharge of the patient. The data were collected through the collaboration of two members of the Tulane visiting staff and the four assistant resident surgeons who were in direct charge of the Tulane surgical wards.

RESULTS OF STUDY

From Dec. 1, 1940 to May 1, 1941, 729 operations were performed at Charity Hospital by thirty members of the Tulane surgical staff. Nine of the seventeen members of the visiting staff and all the thirteen residents and interns used cotton sutures routinely. Three visiting surgeons employed silk sutures routinely; five continued to use catgut sutures. Of 465 cases in which operative procedures were performed and cotton sutures were used the wound in 358 could be classified as clean, in 89 as contaminated and in 18 as infected. Silk sutures were employed in 61 cases, in 37 of which the wound was clean, in 21 contaminated and in 3 infected. Catgut sutures were used in 86 cases; the wound was clean in 57, contaminated in 25 and infected

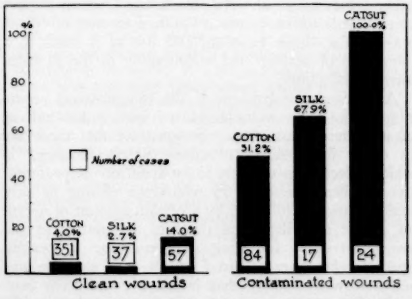

Fig. 2.—Percentage of infected wounds in relation to type of suture material employed.

in 4. Silkworm gut was the sole suture material in 10 instances, and no suture was required in 107 operations.

Of the 57 clean wounds on which catgut sutures were used (figs. 1 and 2), 80.7 per cent healed by first intention, while 19.3 per cent were complicated, 14 per cent by infection. All the contaminated and infected

wounds were complicated. (Twenty-three of the 25 contaminated wounds involved operations in the region of the anal orifice.)

The results with silk were much better. Of the 37 clean wounds sutured with silk, only 5.4 per cent were complicated, 2.7 per cent by infection. However, 70.6 per cent of the contaminated wounds were complicated, 67.9 per cent by infection; all the infected wounds were complicated.

Fig. 3.—Appearance of a patient nine and a half months after subtotal thyroidectomy had been performed. The wound was closed without drainage.

Cotton sutures were employed on 351 clean wounds; of these 4.8 per cent became complicated, 4 per cent by infection (fig. 2). An observation of importance in the evaluation of wounds sutured with cotton was that almost half the contaminated wounds, or 47.6 per cent of 84, healed by first intention. This observation confirms our impression that cotton is better adapted for use in a contaminated or infected field than is any other suture material. As Meade and Ochsner [10] have emphasized, cotton causes a minimal amount of edema and cellular tissue reaction, and use of it leads to a "dry type of healing" not encouraging to the development of infection.

A further consideration of the complications occurring in the clean wounds sutured with cotton will be of interest in that it may demonstrate that there are in every large series of cases certain instances in which infection is unlikely to be avoided. Representative of these are cases in which the closing of skin under tension is followed by a certain amount of necrosis of the skin flaps and cases of amputation of the lower extremity following gangrene due to peripheral vascular disease. In 7 of 14 such cases in our series it was unlikely that infection could have been avoided.

It is gratifying to us that the incidence of complications in clean wounds should be so low in an institution whose patients are drawn from the lowest economic stratum and in which more than half of the operations are performed by the resident staff. It is our belief that this result has been attained largely through the application of an exacting operative technic, an important part of which has been the use of cotton according to Halsted's principles.

The economy with which cotton can be used for sutures has been emphasized by Foss,[11] who stated that the annual expense of suture material in his hospital might have been reduced from $1,500 to $4.20 by the routine use of cotton. While economy was not a prime objective in our adoption of cotton, nevertheless it was interesting to speculate on the saving which might be made by the practice in a large public institution such as Charity Hospital. Accordingly, a survey was made of the number of operations performed and the type and amount of suture materials used in all services for one month (summarized in the accompanying table).

Cost of Suture Materials

Material	Unit Cost	Amount Used per Operation	Cost per Operation
Cotton	$0.10 per 200 yards	25 yards	$0.0125
Silk	$0.933 per 25 yards	25 yards	$0.933
Catgut	$0.1925 per tube	6 tubes	$1.16

Suture material was employed in 647 operations performed during this period. Cotton was used by members of the Tulane surgical staff in 100 surgical procedures at an average cost of 1¼ cents for the 25 yards (22.8 meters) required in each operation. Silk was employed in 78 operations at an average cost of 93 cents for the 25 yards. An average of six tubes of catgut was used in each of 469 operations, at a cost of $1.16 per operation. The total cost of suture materials for one month at Charity Hospital was found to be $618.06. If this month can be taken as representative of the whole year, the cost per annum of suture materials at Charity Hospital can be estimated as $7,416.72. Use of cotton in the same number of procedures would have cost only $97.05.

Two pictures of typical postoperative scars are shown in order to demonstrate the type of healing which is obtained with cotton. Figure 3 shows a patient who had undergone subtotal thyroidectomy nine and one-half months previously. The wound was closed without drainage and healed uneventfully. The scar is even less discernible in real life than it is in the photograph. Figure 4 shows the abdomen of a patient thirteen days after ventral herniorrhaphy. Eight years previously there had been an abscess in the same region of the abdominal wall which had been treated surgically. Following a blow on the abdomen eight months before the present admission, a second abscess formed beneath the old scar, and a hernia appeared in the same area. At operation an abscess was found surrounding a piece of silkworm gut 4 cm. in length and lying in contact with the bladder. The abscess was excised, and, despite the presence of infection, a herniorrhaphy was performed. Sulfanil-

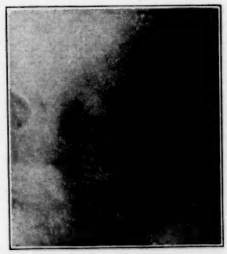

Fig. 4.—Appearance of a patient thirteen days after ventral herniorrhaphy in an infected field.

11. Foss, Harold, in discussion on Estes, W. L., Jr.: End Results in Repair of Inguinal Hernia by a Fascia-to-Fascia Rectus Sheath Closure, Ann. Surg. **113**: 838 (May) 1941.

amide was placed in the wound. Healing was by first intention, and there have been no complications in the five months since operation.

SUMMARY

1. In a previously reported experimental study, cotton suture material has been shown to incorporate the qualities of pliability, satisfactory tensile strength, a high coefficient of friction, stability on exposure to heat and moisture and the failure to produce any great tissue reaction.

2. Cotton suture material has been used routinely in the Tulane University surgical service at Charity Hospital for eighteen months, in approximately 1,800 cases.

3. A study of 465 consecutive wounds in which cotton suture material was employed demonstrated cotton to be highly satisfactory in its clinical application.

4. The low cost of cotton, while not of primary importance, is a desirable feature.

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ABSTRACT OF DISCUSSION

DR. DONALD GUTHRIE, Sayre, Pa.: The important things a surgeon should expect of a suture material are, first, that it should be absolutely sterile. Second, it should have the proper tensile strength when placed in the tissues, it should produce the minimal amount of tissue reaction and by its use the need for drainage of wounds should be greatly reduced, because drainage weakens all wounds and exposes them to dangers of infection. Lastly, it should be economical to use. Since Ochsner and Gage suggested the use of cotton thread to replace silk, my associates and I have used this material and are convinced that it is a much better and a safer suture to use. We feel that the knots of cotton are more secure and that it has a better tensile strength. It produces less tissue reaction and our percentage of infections is now even lower than when we employed silk. In keeping careful track of our cases for several years and comparing the results of nonabsorbable with absorbable sutures, we find that our percentage of infection following the use of nonabsorbable sutures has been much lower than that following the use of catgut; also that our percentage of recurrence following herniorrhaphy has been greatly reduced. We have been able further to dispense with drainage in cases of radical mastectomy and in practically all of our operations for thyroidectomy. Another point of advantage in the use of cotton is that patients are not allergic to the cotton—occasionally one is to silk. We agree with the authors that cotton does not produce sinus formation in the presence of infection. In our clinic cotton is used for ligatures and sutures in all herniorrhaphies, all thyroidectomies, all radical and simple mastectomies, about one half of the clean appendectomies and in about two thirds of the clean abdominal wounds. In this way we can keep a careful check of the results of cotton and of catgut. If any surgeon will investigate this question with an open mind and compare his results after the employment of nonabsorbable sutures with those in which catgut is used, he will be convinced that there are many advantages of nonabsorbable suture material over catgut. We feel that Gage and Ochsner have made a contribution to surgical practice in suggesting the use of cotton as a nonabsorbable suture, because, after a thirteen months experience with it we believe it to be a far better suture and ligature material than silk.

DR. JOHN M. FARRIS, Ann Arbor, Mich.: I am glad to report experimental data which tend to corroborate the views of Drs. Meade and Long and Dr. Ochsner. Certain controversies have come from experimental work on suture material because of the difficulty in controlling conditions. The effect of trauma and tension and incomplete hemostasis may often be confused with the presence of a suture itself. To overcome some of these objections, a series of experiments have been carried out. A piece of silk was placed in the anterior chamber of the rabbit's eye and allowed to remain for fourteen days. During this period it may be observed through the transparent cornea. In general, there is usually but little reaction to the silk, although silk has a tendency to untwist. It is untied at the ends and its diameter has increased twice while it was in the culture medium. A piece of silk in place four weeks showed little difference in the reaction, although it still showed a tendency to untwist. A piece of catgut in three or four days showed a tendency for the strands to undergo dissolution and the aqueous humor to become somewhat opaque. At first we thought the eyes were infected, but cultures in every instance have been negative. In about two weeks the anterior chamber looks more than ever as if it were infected. There is a large amount of exudate about the strands of catgut. The entire anterior chamber becomes completely opaque, and for practical purposes the animal is blind. There is less reaction from the cotton than from any other type of suture material. The cells in the fluid when counted are difficult to find and in a series of 8 animals about 100 cells per cubic millimeter were found, while on the catgut it varied from 2,000 to 600 leukocytes per millimeter, a striking difference in the reaction. A piece of cotton that has been in the eye for four weeks has maintained its small size and its diameter. There is less tendency for it to untwist and fray at the edge. But little reaction occurs in the eye. I have had the opportunity of observing bits of cotton and silk in the eye for a period of a year. These experiments emphasize the view that all sutures are foreign bodies and as such should be used sparingly. A foreign body in some instances on the wound will delay the process of fibroplasia. The suture causes a minimum of foreign body reaction and at that time either disappears from the wound or, if it remains, its sustained presence should not be objectionable. These experiments indicate that cotton fulfils these criteria.

DR. J. E. CANNADAY, Charleston, W. Va.: I am able to corroborate what the authors and the discussers have said with regard to the use of cotton thread sutures in surgery. My associates and I have used cotton thread sutures since the first report made on the subject by Dr. Alton Ochsner in THE JOURNAL. Since that time we have used cotton thread sutures in between 500 and 1,000 cases, and we have recently had occasion to check over about 400 of these cases carefully and we found an incidence of infection in clean cases of about 2 per cent. We have used cotton thread sutures for almost every type of surgery and gynecology, in hernias and perineorrhaphies, in gastric and large bowel resections, cholecystojejunostomies and so on, and find that the material is thoroughly satisfactory when used in accordance with the tenets Halsted laid down for silk. We find that cotton thread suture of the finer type, say 50, is a very satisfactory suture for holding fat together. In the fat abdomen we use it. It holds and heals in beautifully. Since we have been using cotton thread sutures routinely we have had one abdominal wound disruption. That was in a resection of the stomach in which chronic bronchitis developed. However, the wound was promptly repaired with cotton thread sutures and satisfactory healing occurred without infection.

DR. ALTON OCHSNER, New Orleans: A word about the preparation of cotton: As Drs. Meade and Long mentioned, cotton contracts when heated and for this reason it should not be sterilized on a rigid spool. Sterilization can be done in one or two ways. When cotton is sterilized on a rubber tube the cotton becomes shortened and the tube compressed. Another way in which it can be done is to wrap cotton around board. This is the technic used in one of the institutions in which I work. Two ties close together are placed around the skein, and the skein is cut between the two ties. It is then placed in a test tube and autoclaved. A word about its use in cases of infection: If I should be told that I could use cotton in only one type of case, I would choose a patient who has a grossly contaminated abdominal wound. It is imperative that interrupted sutures be used. The wound, even though infected, will usually heal with no difficulty and without discharge of the cotton sutures. The incidence of infection is much less in grossly contaminated wounds than when catgut or even silk is used.

SENILE OSTEOPOROSIS OF THE SPINAL COLUMN

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The syndrome of senile osteoporosis as it is understood today is different in some respects from its early description. In the early cases the diagnosis was made on the basis of the clinical findings and was confirmed at necropsy; as a consequence the diagnosis was usually made in the advanced stages and the postmortem examination showed extensive osteoporosis. Today, with improved methods for diagnosis, routine roentgenologic examination may disclose the condition even without clinical signs and symptoms.

Our report is based on a study of 208 patients, 167 women and 41 men. The average age of all when first seen at the Mayo Clinic was 62, the youngest being 45 and the oldest 87. In the cases reported in the literature, somewhat more advanced ages were represented. In 42 selected from various reports the mean age was 66. These figures indicate that senile osteoporosis is definitely associated with the older age groups.

The relation of this syndrome to the female sex is striking and has been an outstanding feature of all comments, the number of women afflicted being about four times the number of men. In general, the life expectancy of women is longer than that of men; thus more women live to the ages at which osteoporosis occurs. Furthermore, women lead a more sedentary life than men, and an atrophy of disuse has been postulated; however, osteoporosis does afflict persons who have always been extremely active. Many of the patients are widowed or single, and this fact might play a part in the development of osteoporosis on the basis of inadequate diet or conditions incidental to living alone.[1] It was found that 42.5 per cent of the women and 19.8 per cent of the men were either single or widowed.

The usual history is that a woman about 59 first notices weakness, fatigue or a dull ache in the lower part of the back. The dull ache gradually becomes worse and may be diffuse all over the back. This early stage usually lasts several years. Then, as the result of a slight jar, a fall, lifting or bending there may be a sudden snap or acute pain in the back. The pain is severe and often compels the patient to go to bed for a few days or weeks. From this time on the dull backache persists; in addition, sharp agonizing pains occur in the back on the slightest movement; turning, jarring or bending is particularly likely to cause them. The pain occurs chiefly in the lower part of the thoracic region and in the lumbar region. Frequently it is projected along the nerve roots, and so a multitude of referred pains occur. These may be in the neck and shoulders, down the arms, along the ribs, over the precordium, in the epigastrium, in both flanks and over the iliac crests, or there may be associated sciatica. Their relationship to the condition of the back may be noted because of the aggravation that occurs with movement. Although these pains may be strictly localized to one nerve root, it is rare to find any neurologic signs, such as changes in sensation or reflexes.

The average duration of symptoms was three years, although in several cases symptoms referable to the back had been present for twenty to fifty years. These, however, could not be ascribed to osteoporosis. The occurrence of mild trauma as the primary agent in the onset of acute symptoms has been ascribed to preexisting osteoporosis in which mild trauma has produced collapse of a vertebra and severe pain. The pains, in addition to being made worse by movement, are aggravated by lifting, coughing or sneezing, and in some cases the weather may have some effect. Relief is usually obtained in the recumbent position, although turning over in bed often causes severe pain.

Other symptoms are weakness, easy fatigue and nervousness. The patients frequently have a sensation that the back is likely to give way; this may be interpreted as weakness. Decourt [2] expressed the opinion that the nervousness and depression observed are part of the syndrome and that frequently they disappear and are replaced by euphoria with successful treatment of the condition. With the progress of the atrophy of bone the patients themselves notice and their friends remark that they are becoming "round shouldered" and are losing stature. The pain in the back and the root pain gradually become worse and finally compel the patient to go to bed for relief. Patients who have died have done so as a result of associated disease.

On physical examination, the patients present all the signs of senility, general atrophy of the tissues and arteriosclerosis. Frequently they are thin and emaciated, although various states of nutrition are seen. In our series the average height of the women was 5 feet 3 inches (160 cm.) and the average weight was 122½ pounds (55.6 Kg.); of the men, 5 feet 7 inches (170 cm.) and 152½ pounds (69.2 Kg.). These figures indicate that the general nutrition was fairly good in the entire group but was better among the men than among the women. The typical appearance in advanced stages is that of a thin little old woman (fig. 1 *a*, *b*, *c*), with loose wrinkled skin and a rounded back, who walks with short, careful steps in order to avoid jarring. The whole body is held tense in walking by protective muscle spasm. The rounded dorsal kyphosis causes the cervical segment of the spinal column to project forward; this is compensated for by an increase in the normal cervical lordosis. Movements of patients without pain or tenderness are free and normal in range; the usual picture, however, is that of marked limitation, due to muscle spasm, of motions of the spinal column. Tenderness on pressure over the spinous processes is not severe or well localized, but bending and jarring bring on severe pains. On the other hand, many patients are remarkably well preserved, well nourished and healthy in every way except for their complaints in regard to the back.

LABORATORY FINDINGS

The urine usually was normal but occasionally showed small amounts of albumin or pus. In 33 cases the blood showed 12.5 Gm. of hemoglobin or less, per hundred cubic centimeters, whereas examination of

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Abridgement of thesis submitted by Dr. Black to the faculty of the Graduate School of the University of Minnesota in partial fulfilment of the requirements for the degree of Master of Science in Orthopedic Surgery.

1. Meulengracht, E., and Meyer, A. R.: Osteomalacia of the Spinal Column, Acta med. Scandinav. **92**: 584-602, 1937.

2. Decourt, Jacques: A propos des hernies intraspongieuses multiples du disque intervertébral, Bull. et mém. Soc. méd. d. hôp. de Paris **50**: 857-858 (June) 1934.

blood smears and other hematologic studies established a diagnosis of pernicious anemia in 3 cases and of macrocytic anemia in 4. The flocculation reaction was positive in 10 and doubtful in 3. Gastric analysis was carried out in 29 cases, and there was absence of free hydrochloric acid in 11.

A total of 92 determinations of serum calcium were carried out in 68 cases. The average value was 9.8 mg. of calcium per hundred cubic centimeters; the range was 7.8 to 12.7 mg. The great majority of readings were between 9 and 11 mg. Seventy-seven determinations of inorganic phosphorus in the serum were carried out in 58 cases. The mean value was 3.4 mg. per hundred cubic centimeters, with a variation from 2.1 to 6.5 mg. Similarly, 60 determinations of phosphatase in the serum were carried out in 47 cases. The mean value was 3.8 Bodansky units, with a range from 2 to 13.4 units. In 6 cases in which the values were abnormally high or low, no other cause was found to account for the unusual values and subsequent determinations gave normal values. In 1 case in which there was an elevated concentration of serum calcium exploration of the parathyroid glands did not reveal a tumor or hyperplasia. In 2 cases of extensive osteoporosis with chemically normal blood constituents exploration was made, and in both cases the parathyroid glands were found to be normal, in agreement with the reports on similar cases by other authors.

The sedimentation rate of the erythrocytes was determined in 31 cases; the average rate was 22 mm. in one hour, with a range from 3 to 58 mm. In some of the cases in which an increased sedimentation rate was noted there was an associated infection; in the others, however, no adequate explanation could be found for the increased rate, although it was not felt to be due to the osteoporosis.

GROSS PATHOLOGIC CHANGES

The changes which occur in the spinal column depend on the degree of atrophy of bone and on the anatomic peculiarities of the vertebrae and the intervertebral disks. The researches of Schmorl and his co-workers on several thousand spinal columns examined at necropsy are outstanding in their demonstration of the normal anatomic and histologic characteristics of the spinal column, as well as of the changes which occur at various ages throughout life under the influences of age, normal activity, trauma and disease. The descriptions that follow have been taken mainly from the writings of Schmorl and his co-workers,[3] although other authors have written on the subject.[4]

Senile osteoporosis, involving as it does primarily the trabeculae of spongy bone, is most evident in the vertebrae. Schmorl [5] has demonstrated the changes in the vertebrae by making preparations in which the marrow tissue and other organic elements have been removed. The cortical bone is much thinner than normal, and there is enlargement of the marrow spaces and the medullary cavity. The surfaces of the trabeculae are clean and smooth and indicate a long, slow, vascular resorption rather than an osteoclastic resorption, in which the surfaces would be rough and irregular. The individual trabeculae are much thinner and fewer than is normal, but their architectural arrangement is maintained.

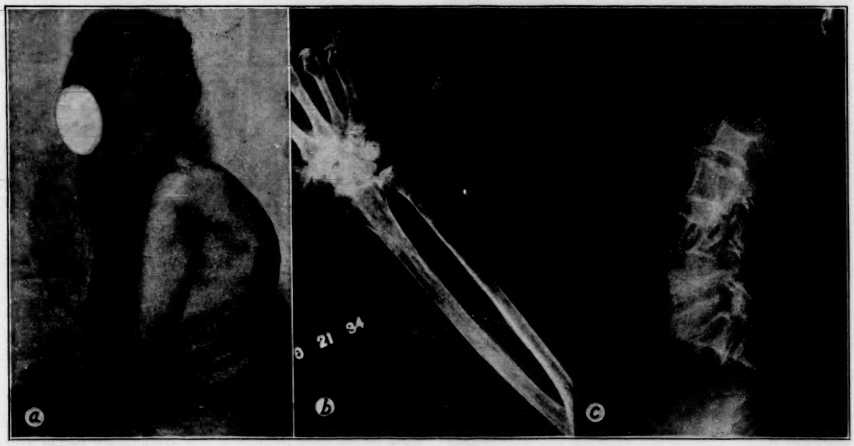

Fig. 1.—*a*, Rounded kyphosis of the thoracic segment of the spinal column resulting from senile osteoporosis; *b*, forearm of the same patient revealing moderate osteoporosis; *c*, lumbar segment of the spinal column revealing osteoporosis, expanded intervertebral disks and compressed vertebrae.

When osteoporosis has progressed to a certain degree, the bony trabeculae are no longer able to resist the weight of the body and the internal pressure of the intervertebral disks. There occur a collapse of the central portions of the vertebral body and expansion of the nucleus pulposus and disk. The appearance of the narrowed vertebrae has been likened to that of "fish vertebrae" by Schmorl.[6] This mechanism will not

3. Schmorl, G.: Ueber die an den Wirbelbandscheiben vorkommenden Ausdehnungs- und Zerreissungsvorgänge und die dadurch an ihnen und der Wirbelspongiosa hervorgerufenen Veränderungen, Verhandl. d. deutsch. path. Gesellsch. **22**: 250-262, 1927; footnotes 5, 6 and 19.

4. Joplin, R. J.: The Intervertebral Disc: Embryology, Anatomy, Physiology and Pathology, Surg., Gynec. & Obst. **61**: 591-599 (Nov.) 1935.

5. Schmorl, G.: Zur Technik der Knochenuntersuchung. Bemerkungen zur Diagnose der Ostitis deformans Paget, Ostitis fibrosa v. Recklinghausen und Osteoporose, Beitr. z. path. Anat. u. z. allg. Path. **87**: 585-598, 1931.

6. Schmorl, G.: Die pathologische Anatomie der Wirbelsäule, Verhandl. d. deutsch. orthop. Gesellsch. **21**: 3-39, 1926.

occur if the disks, through degenerative processes, have lost their expansibility. Fissures and cracks in the cartilaginous plates, arising through repeated small injuries incidental to normal activity, may allow the tissue of the nucleus pulposus to work its way out into the substantia spongiosa, giving rise to Schmorl's nodes. The vertebral bodies may collapse in their anterior part, as in a true compression fracture; in this way numerous pathologic fractures occur, either without any or with only minor degrees of trauma.

Degenerative changes in the disks occur usually in the upper thoracic region and lead to thinning of the disks, hypertrophic changes about the anterior margins of the vertebral bodies and dorsal kyphosis. This type of kyphosis is the usual one seen in old persons. The disks in the lower thoracic region and in the lumbar region

Fig. 2.—Extreme osteoporosis of thoracic and lumbar vertebrae with compression fractures and expanded intervertebral disks. This patient was obese.

maintain their expansibility longer than those in the upper thoracic region. They are also normally more expansile, and so the phenomenon of ballooned disks is more often seen in the lower thoracic and the upper lumbar region.

ROENTGENOLOGICALLY APPARENT CHANGES IN SENILE OSTEOPOROSIS

The distribution of the ballooned disks and compressed vertebral bodies in our group was the same as that found by Junghanns.[7] The intervertebral disks in the lower thoracic and the lumbar region were the ones most frequently involved, and the vertebrae in the same regions were most frequently compressed. In general, the degree of expansion and the number of vertebrae compressed depend on the grade of osteoporosis. In some patients, all the disks in the thoracic and lumbar regions were ballooned (figs. 2 and 3) and many vertebrae were crushed. In others few such changes were present. Of 18 patients with osteoporosis grade 1 (on a basis of 1 to 4), none had ballooning of the disks; of 47 with osteoporosis grade 2, 34 per cent had ballooning; of 45 with osteoporosis grade 3, 93.3 per cent had ballooning, and of 19 with osteoporosis grade 4, all had extensive ballooning. The incidence of compression of the vertebrae showed a similar variation with the degree of osteoporosis, whereas the presence of hypertrophic changes was common to all groups and showed little relationship to the degree of atrophy of bone.

The cause of the backache and of the sharp radiating pains in osteoporosis has always been a source of discussion. The dull backache has been attributed to osteoporosis per se, and the attribution appears to be justified in many cases because of the association of this type of backache with mild osteoporosis. However, many patients have severe osteoporosis without pain. The sharp pains occur definitely along nerve roots, but they are not due to pressure on the roots, because the foramens are usually free. These pains bear a definite relationship to the site of the ballooned disks and compressed vertebral bodies. The most satisfactory explanation is that the pain is a reflex one that arises from the recently compressed vertebrae and is referred along the nearby nerve roots. Many ballooned disks and compressed vertebrae may be present without related pain.

It has been our impression that in the syndrome of senile osteoporosis of the spinal column, the osteoporosis attains its greatest degree in the bones of the vertebral column. This impression is borne out by the roentgenologic findings in 23 cases in which roentgenograms of the long bones of the upper or the lower extremity, in addition to those of the vertebral column, were available for study.

DIFFERENTIAL DIAGNOSIS

The numerous factors and diseases which lead to atrophy of bone in the spinal column of adults frequently occur in persons in the older age groups and so must be distinguished from senile osteoporosis.

Hyperparathyroidism.—Senile osteoporosis has probably been erroneously diagnosed as hyperparathyroidism more often than as any other condition, and even today an unequivocal roentgenologic diagnosis of senile osteoporosis is difficult to make without first ruling out hyperparathyroidism. The fact that the results of laboratory tests, usually relied on to distinguish between the two, may be within normal limits makes the problem in some cases even more difficult.

Hyperparathyroidism produces a generalized osteoporosis described by Bauer and Camp,[8] by Camp[9] and by Camp and Ochsner[10] as a peculiar, miliary mottling and granular appearance of the bone best seen in the flat bones. The roentgenograms of the spinal column may closely resemble those characteristic of senile

7. Junghanns, Herbert: Anatomische Grundlagen und Röntgenbilder der Adoleszenten-, Alters-, und osteoporotischen Kyphosen, Röntgenpraxis **4**: 97-105, 1932; Altersveränderungen der menschlichen Wirbelsäule (mit besonderer Berücksichtigung der Röntgenbefunde): II. Die Alterskyphose, Arch. f. klin. Chir. **166**: 106-119, 1931.

8. Bauer, Walter, and Camp, J. D.: Malacic Diseases of Bone, in Nelson New Loose-Leaf Surgery, New York, Thomas Nelson & Sons, 1935, vol. 3, pp. 175n-177a.

9. Camp, J. D.: Roentgenologic Changes in Malacic Disease of Bone, California & West. Med. **41**: 152-157 (Sept.) 1934; Roentgenologic Changes in Malacic Diseases of Bone, Radiology **26**: 399-408 (April) 1936.

10. Camp, J. D., and Ochsner, H. C.: The Osseous Changes in Hyperparathyroidism Associated with Parathyroid Tumor: A Roentgenologic Study, Radiology **17**: 63-69 (July) 1931.

osteoporosis, but the characteristic osteoporosis in the skull and flat bones and the subperiosteal decalcification, bowing, fractures and cyst formation in the long bones, in most cases, are easily distinguished from the homogeneous osteoporosis in the flat bones and the slight changes in the long bones seen in cases of senile osteoporosis. When roentgenograms do not give conclusive evidence of hyperparathyroidism, the results of laboratory tests frequently will confirm the diagnosis. The concentration of serum calcium is usually 11 mg. or more per hundred cubic centimeters, and the concentration of inorganic phosphorus in the serum is lowered, whereas the value for serum phosphatase is usually high. The final test is a marked increase in the urinary excretion of calcium and phosphorus. These values are all within normal limits in senile osteoporosis.

Hyperthyroidism.—Roentgenologically, the changes in the spine in some cases of exophthalmic goiter are indistinguishable from those of senile osteoporosis.[11] If the patient is less than 40, the question of senile osteoporosis does not arise; with older patients, the diagnosis is made on the basis of the clinical history and findings of exophthalmic goiter. The blood chemistry is normal, the basal metabolic rate is increased and the excretion of calcium is markedly increased, according to studies of the calcium balance. The degree of osteoporosis depends on the length of time that hyperthyroidism has been present and may be out of all proportion to the increase in the basal metabolic rate.[12]

Pituitary Basophilism and Adrenocortical Syndromes.—The syndrome of pituitary basophilism and the adrenocortical syndrome both include a homogeneous, generalized atrophy of bone practically identical with that found in senile osteoporosis.[13] The age of some patients and the physical characteristics of obesity, hypertension, hirsutism and abdominal striae with changes in the primary and secondary sex characteristics serve to distinguish these conditions from senile osteoporosis. However, there were a number of cases in the group studied in which osteoporosis, hypertension and obesity occurred; the other characteristics of these two syndromes were not noted. Similar observations by others have led to the hypothesis that senile osteoporosis is due to changes in the pituitary gland and in other glands of internal secretion.[14]

Metastatic Malignant Lesions.—The question of the presence of an osteoclastic type of metastatic malignant lesion frequently arises in connection with extensive osteoporosis of the spinal column of persons more than 40. The diagnosis is usually made without difficulty, roentgenologically, by the presence in malignant disease of localized regions of destruction, invasion of the pedicles of the vertebrae or regions of destruction in the flat bones. However, the osteoporosis caused by infiltration of malignant tumor cells is often homogeneous in its distribution. The softened vertebral bodies under the effect of the expansile intervertebral disks become "fish vertebrae," and many pathologic fractures occur.[15] Two factors of great value in the diagnosis of generalized carcinomatosis with or without a known primary lesion are the sedimentation rate and the blood smear. The sedimentation rate of the erythrocytes is rapid and, in the absence of infection or other factors causing such a high rate, is diagnostic of generalized carcinomatosis. The blood smear in cases in which there is extensive metastasis to bone frequently shows immaturity of the myeloid cells, the so-called leukemoid reaction, and in the absence of other factors causing such a change is also diagnostic of metastasis of a malignant tumor to the bone marrow.

Multiple Myeloma.—Multiple myeloma, like metastatic carcinoma and by the same mechanism, may give rise in the vertebral column to osteoporosis, ballooned

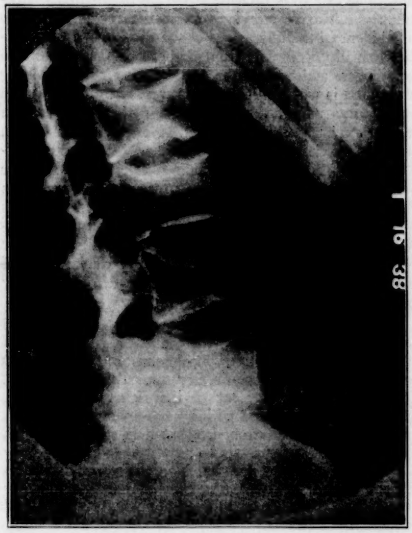

Fig. 3.—Senile osteoporosis of the lumbar segment of the spinal column with expanded intervertebral disks and compressed vertebrae.

intervertebral disks and collapsed vertebrae identical with the roentgenographic picture of senile osteoporosis. Usually, however, localized evidence of destruction of bone is seen in the ribs, the pelvis and most clearly of all in the skull.[8] The clinical symptoms are similar to those of senile osteoporosis except that the pain is more severe. It persists even while the patient is recumbent and may require morphine for relief. Secondary renal changes are common and may lead to albuminuria and an increase in the nonprotein nitrogen of the blood.[16] Bence-Jones protein in the urine in some cases of multiple myeloma clearly distinguishes the condition from senile osteoporosis, in which Bence-Jones proteinuria is absent. Sternal puncture will reveal the presence of myeloma cells in a high percentage of cases.

11. Dunlap, H. F., and Moore, A. B.: Osteoporosis Secondary to Hyperthyroidism, M. Clin. North America **12**: 1511-1519 (May) 1929. Plummer, W. A.: Cases Showing Osteoporosis Due to Decalcification in Exophthalmic Goiter, Proc. Staff Meet., Mayo Clin. **3**: 119-121 (April 11) 1928.

12. Aub, J. C.; Bauer, Walter; Heath, Clark, and Ropes, Marion: Studies of Calcium and Phosphorus Metabolism: III. The Effects of the Thyroid Hormone and Thyroid Disease, J. Clin. Investigation **7**: 97-137 (April) 1929.

13. Cushing, H. J.: Dyspituitarism, Arch. Int. Med. **51**: 487-557 (April) 1933. Wilder, R. M.: Symposium: Polyglandular Dyscrasias Involving Abnormalities of Sexual Characteristics, Proc. Staff Meet., Mayo Clin. **8**: 97-110 (Feb. 15) 1933. Cushing.[13]

14. Bergeim, Olaf: The Absorption of Calcium and Phosphorus in the Small and Large Intestines, J. Biol. Chem. **70**: 51-58 (Sept.) 1926.

15. Ghormley, R. K.; Sutherland, C. G., and Pollock, G. A.: Pathologic Fractures, J. A. M. A. **109**: 2111-2115 (Dec. 25) 1937.

16. Geschickter, C. F., and Copeland, M. M.: Tumors of the Bone (Including the Jaws and Joints), revised ed., New York, American Journal of Cancer, 1936, pp. 441-488.

Chronic Infectious Arthritis.—Extensive osteoporosis is frequently seen in the spinal column and around the involved joints in cases of chronic infectious arthritis. It is difficult to say whether this atrophy of the bone is produced by the infectious process itself or whether it is the result of the disuse and inactivity so commonly an accompaniment of this disease. In excluding cases of chronic infectious arthritis from the group of cases of senile osteoporosis, certain criteria were used. The history of a prolonged course of pains, stiffness, redness and swelling of other joints, particularly if the disease came on before the age of 40, with anemia, an increased sedimentation rate, atrophy and destructive changes in other joints, was taken as sufficient evidence of chronic infectious arthritis.

Spondylitis Deformans.—In cases of early spondylitis deformans there is mild to moderate osteoporosis without the extensive ankylosis of all the vertebrae that is so evident in the late stages of the disease. This condition usually occurs in younger persons; they complain of stiffness and pain in the back which persists on lying down and is worse in cold damp weather. Examination reveals much limitation of motion in the spinal column and in expansion of the thorax. Roentgenographically, destructive changes in the sacroiliac joints and intervertebral facets, with beginning calcification of the spinal ligaments, indicate the presence of spondylitis deformans. Examination of the blood frequently reveals evidence of secondary anemia and an increased sedimentation rate. In senile osteoporosis there is not the destruction of these joints or the calcification of ligaments that is seen in spondylitis deformans, nor is there an increased sedimentation rate.

Osteomalacia.—It is now known that the essential factor in the production of osteomalacia is a failure of the intake [17] of calcium, phosphorus and vitamin D to satisfy the bodily requirements for these substances. It is the adult equivalent of the rickets of children. Osteomalacia associated with pregnancy and lactation is rarely seen in most countries, but it is still endemic in China and certain parts of India. Osteomalacia may occur with various nutritional deficiencies, such as idiopathic steatorrhea, sprue,[18] celiac disease and other conditions.[19] The concentration of calcium in the blood is high, as in rickets.

Roentgenologically the changes in the spinal column may be the same in both osteomalacia and senile osteoporosis, but usually there is marked distortion of the bony pelvis, and the long bones are involved to a greater extent in osteomalacia than is ordinary in senile osteoporosis. In addition, osteomalacia is characterized by symmetrical areas of decalcification or pseudofractures of the long bones, the so-called Looser zones. It may be impossible to distinguish mild osteomalacia from senile osteoporosis unless the age of the patient is such as to exclude the latter.

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ETIOLOGY

It has been generally accepted in the past that osteoporosis is a natural accompaniment of advancing age. However, when one observes a large number of elderly persons, it is readily apparent that only a small proportion suffer from a severe lack of calcium in their bones. One is therefore led to believe that senile osteoporosis is a pathologic process. Many hypotheses have been proposed to explain its onset, the more important of which may be listed as follows: dietary deficiency, gastric achlorhydria, endocrine imbalance and inactivity.

It is certain that in not all cases of osteoporosis is there deficiency in the calcium intake, and so other hypotheses have been put forward. The place that gastric acidity plays in the absorption of calcium has been stressed recently. It is reasonable to suppose that achlorhydria when present may play a part in the production of osteoporosis by interfering with the absorption of calcium. However, it can be only a minor part, for Schmidt and Greenberg [20] have shown that normal assimilation of calcium does occur in the absence of hydrochloric acid in the stomach. In the present study, gastric analysis was carried out in 29 cases. In 18 the contents of the stomach showed normal values for hydrochloric acid, and in 11 free hydrochloric acid was absent. These results would indicate that achlorhydria may be a factor in the production of osteoporosis in some cases but that in the majority of cases other factors are responsible.

It has been pointed out that in pituitary basophilism [21] there is extensive osteoporosis. Rutishauser and Maulbetsch [22] in 1934 proposed the hypothesis that in old age there is a proliferation of the basophilic cells and therefore a relative preponderance of these cells in the pituitary gland and that the secretion derived from them causes osteoporosis. There has been little confirmatory evidence for the theory. There have been various attempts to show that senile osteoporosis is the result of parathyroid hyperplasia. However, these probably involved errors in diagnosis, since the preponderance of evidence seems to indicate that in senile osteoporosis the parathyroid glands are normal. In the present series, the parathyroid glands were explored in 3 cases and in all 3 were entirely normal.

Associated with the osteoporosis in our cases were a group of diseases, many of which, for example, arteriosclerosis, coronary sclerosis and cardiac failure, were associated with old age and had no bearing on the occurrence of atrophy of bone. Others, such as hypertension, cholecystitis and asthma, were regarded as incidental. There was a small group of diseases which did perhaps play some secondary part in the production of osteoporosis. In 3 cases of pernicious anemia, malnutrition and achlorhydria may have affected the absorption of calcium. In 8 cases of diabetes mellitus, acidosis or dietary regulation may have interfered with the calcium metabolism. Golden and Abbott [23] and others have noted the association of diabetes mellitus with osteoporosis. In 1 case of duodenal ulcer and in 1 of Addison's disease, the diet and malnutrition may have played parts in the causation of the osteoporosis.

20. Schmidt, C. L. A., and Greenberg, D. M.: Occurrence, Transport and Regulation of Calcium, Magnesium and Phosphorus in the Animal Organism, Physiol. Rev. **15:** 297-434 (July) 1935.

21. Cushing, Harvey: Further Notes on Pituitary Basophilism, J. A. M. A. **99:** 281-284 (July 23) 1932.

22. Rutishauser, E., and Maulbetsch, Annie: Der Calcium-Phosphorgehalt des Skeletts und des Blutserums bei einfacher, seniler Osteoporose, Beitr. z. path. Anat. u. z. allg. Path. **94:** 332-344, 1934.

23. Golden, Ross, and Abbott, Hodson: The Relation of the Thyroid, the Adrenals and the Islands of Langerhans to Malacic Diseases of Bone, Am. J. Roentgenol. **30:** 641-648 (Nov.) 1933.

In 33 cases there was moderate secondary anemia. The anemia is suggestive of general poor health which might have been an etiologic factor in the osteoporosis.

TREATMENT

The object of therapy in cases of senile osteoporosis is threefold: first, to relieve the severe pain; second, to prevent further deformity, and third, to promote

TABLE 1.—*Results of Treatment in Senile Osteoporosis*

Type of Treatment	Result: Group 1* No.	%	Group 2 No.	%	Group 3 No.	%	Group 4 No.	%	Total
Calcium, phosphorus, vitamin D, physical therapy and support to back	10	22.2	16	35.6	16	35.6	3	6.7	45
The same without vitamin D	0	0	0	0	3	75.0	1	25.0	4
The same without calcium or phosphorus	2	25.0	3	37.5	3	37.5	0	0	8
Subtotal	12	21.1	19	33.3	22	38.6	4	7.0	57
Physical therapy and support to back without calcium, phosphorus or vitamin D	1	6.6	4	26.7	7	46.7	3	20.0	15
Total	13	81.1	23	31.9	29	40.3	7	9.7	72

* Group 1 "cured" or "very much better"; group 2 "much better" or "better"; group 3 "the same" or "a little better"; group 4 "worse."

recalcification of bone. Relief of pain is best obtained when the patient is recumbent. Too prolonged rest in bed should be avoided, since inactivity tends to cause increased atrophy of bone and it is difficult to get patients up and about again. In addition, the application of heat and massage to the spine does much to relieve pain and muscle spasm.

The problem of preventing further loss of calcium from the bones is one of diet and nutrition. The first consideration in the diet is that the carbohydrate, fat and protein constituents be adequate, for many old persons are undernourished and anemic, and their dietary habits are often faulty. Good general health aids in the normal absorption and utilization of calcium,[24] phosphorus and vitamin D. The diet should include milk, cheese, eggs and other foods high in calcium and phosphorus in order to supply these elements in the forms in which they are most easily absorbed.[25]

In practice, the diet is supplemented by salts of calcium and phosphorus and concentrates of vitamin D. Calcium salts may be given orally, intravenously or intramuscularly. Calcium is utilized better when parenterally administered than when taken orally; however, parenteral administration is disagreeable to the patient and is impractical, especially when treatment extends over months and years, because the end results are the same as for oral administration. Different authors have used various salts, such as calcium chloride, calcium lactate, calcium gluconate, calcium chlorate and calcium glycerophosphate, with equally favorable results for various conditions requiring calcium therapy. In order to supply both calcium and phosphorus, various phosphate salts of calcium have been used.[26] These are relatively insoluble, but in the presence of adequate amounts of vitamin D they are readily absorbed.[27] Tribasic calcium phosphate has been most commonly used at the Mayo Clinic because it contains more calcium and phosphorus per gram than the other salts. Although the daily requirement of calcium is about 0.5 to 1 Gm. in actual treatment an excess is given to insure adequate absorption.[25] The dose for tribasic calcium phosphate is 1 teaspoon three times a day. It has been pointed out that vitamin D is essential for the absorption and utilization of calcium and phosphorus. The daily dose recommended is 625 units[28] for normal adults; 10,000 to 50,000 units may be used in the treatment of vitamin D deficiency states.

The consensus in regard to the efficacy of treatment of senile osteoporosis seems to be one of confirmed pessimism; however, most reports have shown favorable progress of patients treated with calcium and vitamin D. The results of treatment in our group have been studied to determine how beneficial the therapy was. Many patients could not be traced, others had died and for those who did reply it was sometimes difficult to evaluate the effects of the separate therapeutic procedures advised. Follow-up reports were received on 83 cases, in 11 of which death had occurred and there was no information available relating to the condition of the spinal column. In the remaining 72 the average time elapsed since the initial examination and treatment was two and three-tenths years; the longest time was nine years. In order to compare the effect of the various therapeutic measures (table 1) the patients were divided into four groups: (1) "cured" or "very much better," (2) "much better" or "better," (3) "the same" or "a little better" and (4) "worse." The symptoms of 50 per cent of the 72 patients were definitely improved. When we compare the patients treated with calcium and phosphorus, with vitamin D or with all three drugs with those who did not receive these essentials we find that 54 per cent of the former and only 33 per cent of the latter were benefited by the treatment.

TABLE 2.—*Relation of Duration of Treatment to Results for Patients to Whom Calcium, Phosphorus and Vitamin D Were Given*

Duration of Treatment	Result: Group 1*	Group 2	Group 3	Group 4	Total
Six months and less	1	2	2	2	7
Six months to a year	4	5	3	0	12
One to two years	1	4	3	0	8
More than two years	4	5	3	1	13
Unknown	..	..	5	..	5
Total	10	16	16	3	45

* Group 1 "cured" or "very much better"; group 2, "much better" or "better"; group 3 "the same" or "a little better"; group 4 "worse."

When results are considered with respect to the length of time the treatment was carried out (table 2), only the group of cases in which calcium, phosphorus and vitamin D were given can be studied. In the other groups, there were many cases in which the length of time that the treatment had been given could not be

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25. Bassett, S. H.: Mineral Exchanges of Man: Balances of Electrolytes in a Case of Hyperparathyroidism, J. Nutrition **9**: 323-343 (March) 1935.

26. Higgins, G. M., and Sheard, C.: Secondary Calcium Phosphate Versus Tertiary Calcium Phosphate in the Nutrition of Growing Chicks, Proc. Staff Meet., Mayo Clin. **8**: 249-252 (April 26) 1933.

27. Adams, Mildred; Boothby, W. M., and Snell, A. M.: Metabolic Studies in Osteoporosis, Am. J. Physiol. **114**: 383-398 (Jan.) 1936.

28. Dosage of Preparations Containing Vitamins A and D, Report of the Council on Pharmacy and Chemistry, J. A. M. A. **109**: 507 (Aug. 14) 1937.

determined, and the remaining cases were too few for comparison. The symptoms of only 43 per cent of the patients treated for less than six months were improved. On the other hand, the symptoms of 70 per cent of the patients treated for six months or longer were improved.

With regard to the roentgenographic evidence of improvement, there were 18 cases in which follow-up roentgenograms were available. The roentgenograms were taken on an average of twenty-nine months after the beginning of treatment. In no case was there a sufficient change to enable one to say that it was due to recalcification and not to variation in the technic used in taking the roentgenogram.

CHANCROID

TREATMENT WITH SULFATHIAZOLE AND SULFANILAMIDE

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This report deals with 175 patients with chancroid, 150 treated with sulfanilamide and 25 with sulfathiazole. There were 167 men and 8 women, 127 Negroes, 44 white persons, 3 Puerto Ricans and 1 Chinese. The average age was 30.2 years, the youngest patient being 18 and the oldest 58. The majority of the lesions were on the external genitalia (fig. 1). Two patients had ulcerations on the pubis, and 2 had them around the anus. Forty-eight had multiple lesions. The average duration of the lesions was thirty-one days. There were two of five days' and one of three years' duration.

DIAGNOSIS

The diagnosis of uncomplicated chancroid was based on the identification of Hemophilus ducreyi on smear from a characteristic ulcerative lesion and a positive reaction to Ducrey vaccine given intradermally. In addition, absence of Treponema pallidum on dark field examination and negative Wassermann and Frei reactions were required.

The most reliable single factor in the precise diagnosis of chancroid is the identification of the Ducrey bacillus, discovered by Augusto Ducrey of Rome in 1892 (fig. 2). The failure to demonstrate Ducrey bacilli on smear does not necessarily rule out this disease. Lesions which are contaminated or treated with caustics, or of long duration, with sloughing areas, or multiple infections often yield poor smears in which it is difficult to identify the organism. After thorough cleansing of such lesions with saline solution for two days repetition of the smear is more likely to reveal it. Among the 175 cases reported here the Ducrey organism, stained by the Unna-Pappenheim method, was demonstrable in 155 (88.5 per cent) and not found in 20 (11.5 per cent). In the 20 cases the reaction to the intradermal injection of Ducrey vaccine was positive.

REACTION TO INTRADERMAL INJECTION OF DUCREY VACCINE

The reaction following the intradermal injection of 0.1 cc. of Ducrey vaccine is specific.[1] At the end of forty-eight hours, a papule 10 mm. in diameter, surrounded by a zone of erythema 5 mm. wide, denotes a positive reaction. A negative reaction leaves little to be seen at the site of inoculation (fig. 3). The test was introduced by Ito in 1913 and later by Reenstierna. In 1923 Nicolle and Durand in France introduced a commercial product known as dmelcos vaccine. Both these vaccines employ killed Ducrey organisms. A suitable tested domestic vaccine is now available commercially. The reaction becomes positive for the first time between eight and fifteen days after the appearance of the local lesion.[2] A negative reaction after this time rules out a chancroidal infection in about 95 per cent of cases.[3] A positive reaction may mean that the patient has a chancroidal lesion at the time the test is performed or that he has had a chancroidal lesion at one time. The reaction probably remains positive throughout the patient's life. We have observed no reversal of the intradermal reaction after successful therapy.

Table 1 indicates that in cases of proved chancroid there were only 5.4 per cent of negative reactions. In the cases of other diseases listed, in which there was no clinical evidence of or smear positive for chancroid, the large number of positive reactions to intradermal injections of vaccine likely indicates past chancroidal infections.[4]

CLINICAL CHARACTERISTICS

In all cases there were definite ulcerations suggestive of chancroid. Inguinal adenitis was present in 73 (42 per cent); in 55 (75 per cent) it subsided without suppuration, and in 18 (25 per cent) the abscess broke down. In 8 of the 18 cases of definite inguinal abscess there was draining of the inguinal sinuses due to spontaneous rupture of the abscesses. There were 55 cases (75 per cent) of unilateral and 18 (25 per cent) of bilateral adenopathy.

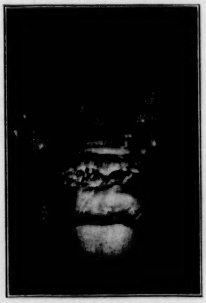

Fig. 1.—Chancroidal ulceration of the prepuce throughout the entire circumference, with the consequent production of paraphimosis.

The chancroidal bubo consists of inguinal nodes which are acutely inflamed and matted together and are extremely tender. The bubo is associated with systemic manifestations, such as fever, malaise and leukocytosis. The purulent material aspirated from broken down abscesses is thick and has a characteristic brick red color. In many cases the pus aspirated will not show organisms on smear or culture, although a potent antigen for the Ducrey intradermal test may be prepared in a manner similar to that used for the Frei antigen. In some cases, however, Ducrey bacilli may be cultured from the inguinal abscess.[5]

From the Central Clinic, Bureau of Social Hygiene, Department of Health, City of New York.

1. Cole, H. N., and Levin, E. A.: The Intradermal Reaction for Chancroids with Bubo Pus, J. A. M. A. **105**: 2040 (Dec. 21) 1935.

2. Greenblatt, R. B., and Sanderson, E. S.: Intradermal Chancroid Bacillary Antigen Test as an Aid in Differential Diagnosis of Venereal Bubo, Am. J. Surg. **41**: 384, 1938.

3. Saunders, H. C.; Ganizares, O., and Reider, R. F.: Chancroid: A Comparative Study of the Ito Test Made with Three Vaccines, New York State J. Med. **39**: 447, 1939.

4. Robinson, H. M.: An Analysis of Intracutaneous Tests on Three Hundred and Nine Patients for Lymphogranuloma Venereum and Chancroid, South. M. J. **33**: 144, 1940.

5. Sanderson, E. S.: The Laboratory Aspects of Chancroid and Lymphogranuloma Venereum, Am. J. Pub. Health **30**: 683, 1940.

METHOD OF TREATMENT AND RESULTS

The earliest reports of successful therapy of chancroid with sulfanilamide appeared in the United States and in England almost simultaneously in March,[6] April [7] and May [8] 1938. Since then confirmatory reports have come from many sources here and abroad.[9]

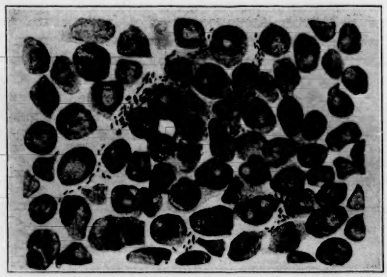

Fig. 2.—Ducrey organisms. Note the parallel "school of fish-like" arrangement of the organisms as they are seen on direct smear from chancroidal lesions.

All our patients were ambulatory and were seen in a clinic. Of the 175 treated, 150 received sulfanilamide orally, 1.2 Gm. (20 grains) four times a day for the first five days, followed by 0.6 Gm. (10 grains) four times a day for the next nine days, a total of 45.6 Gm.

TABLE 1.—*An Evaluation of the Intradermal Reaction to Ducrey Vaccine* *

Clinical Diagnosis	Number of Cases	Positive Reactions		Negative Reactions	
		Number	Percentage	Number	Percentage
Chancroid					
With adenitis	33	33	94.6	0	5.4
Without adenitis	60	55		5	
Control cases					
No history or clinical evidence of chancroid or adenitis (Saunders and his associates [5])	117	3	2.6	114	97.4
Other diseases tested					
Lymphogranuloma venereum with adenitis and positive Frei reaction	39	15	38	24	62
Granuloma inguinale	22	11	50	11	50
Syphilitic chancre	3	1	33.3	2	66.7

* The Ducrey vaccine was supplied by the Lederle Laboratories, Inc.

(700 grains) in fourteen days.[10] The remaining 25 patients received sulfathiazole orally, 0.5 Gm. (7.5 grains) four times a day for ten days. Thus a total of 20 Gm. (300 grains) was used.[11] At the end of the stated period administration of each drug was stopped whether or not the lesion had healed.

Mild toxic phenomena, such as occasional nausea, dizziness and cyanosis, were present in the sulfanilamide-treated group. Two patients in the sulfathiazole group had conjunctivitis and 1 erythema nodosum during therapy. The two groups were singularly free of any major toxic reactions. There was no anuria or hematuria.

Local application of powdered sulfanilamide or sulfathiazole proved efficacious for superficial lesions.[12] For deeper ulcerations of long duration oral therapy was needed in addition to produce healing.[13] There is no contraindication to the simultaneous use of local and systemic chemotherapy. The results of therapy were uniformly successful with the two drugs. All lesions healed within an average of fourteen days. In this series we did not find any lesions resistant to the form of therapy employed (figs. 4, 5 and 6).

SURGICAL ASPECTS OF CHANCROID

Before the advent of chemotherapy surgical intervention in cases of chancroid included incision and drainage of fluctuant buboes, the "dorsal slit" of the prepuce, cauterization of open lesions and circumcision. Since the introduction of sulfanilamide and its derivatives, radical elective surgical procedures have been eliminated. In all the cases of inguinal adenopathy, with or without abscess formation, there was no necessity for incision. Aspiration was found sufficient when necessary. As a general rule, any incision of the prepuce in the presence of an active chancroidal lesion will result in the implantation of the Ducrey organism in the incision. Thus a spread of the local infection by unavoidable autoinoculation is produced and defeats the purpose for which the incision was originally performed.

In a series of 247 cases of circumcision for chancroid reported from Cleveland,[14] "autoinoculation along the line of incision was almost invariably encountered but was not troublesome when local treatment was instituted with various antiseptic solutions over a period of twenty-eight days in a hospital." Circumcision of a patient who has active chancroidal disease on the genitals, even with paraphimosis, has not been found advisable or necessary in any of the cases here reported. The edema and infection subsided with oral chemotherapy.

Fig. 3.—Intradermal reaction to Ducrey vaccine forty-eight hours after the test was performed. Note the vesiculation of the central nodule and the peripheral erythema.

6. Kornblith, B. A., and Chargin, L.: Chancroid, Cured with Sulfanilamide: Lymphogranuloma Venereum; Syphilis, Arch. Dermat. & Syph. **38:** 476 (Sept.) 1938.

7. Hanschell, H. M.: Sulfanilamide in the Treatment of Chancroid, Lancet **1:** 886, 1938.

8. Hutchison, A.: Treatment of Chancroidal Bubo with Sulfanilamide, Lancet **1:** 1047, 1938. Barchelor, R. C. L., and Lees, R.: Treatment of Chancroid with Sulfanilamide, Brit. M. J. **1:** 1100, 1938.

9. Kornblith, B. A.; Jacoby, A., and Wishengrad, M.: Treatment of Chancroid with Sulfanilamide, J. A. M. A. **111:** 523 (Aug. 6) 1938; Sulfanilamide in Treatment of Chancroid, New York State J. Med. **39:** 364, 1939. Culp, O. S.: Treatment of Chancroid with Sulfanilamide, Am. J. Syph., Gonor. & Ven. Dis. **24:** 622, 1940.

10. Sulfanilamide was supplied by the Winthrop Chemical Co., Inc.

11. Sulfathiazole was supplied by Lederle Laboratories, Inc.

12. Lepinay: The Local Application of Sulfanilamide or Its Derivatives in Powder Form for Chancroid, Bull. Soc. franç. de dermat. et syph. **45:** 1728, 1938.

13. Fields, R. S., and Weinstein, S. S.: The Use of Sulfanilamide Powder Locally in the Treatment of Chancroid, Urol. & Cutan. Rev. **42:** 880, 1938.

14. Rauschkolb, J. E.: Circumcision in the Treatment of Chancroidal Lesions of the Male Genitalia, Arch. Dermat. & Syph. **39:** 319 (Feb.) 1939.

Circumcision after cure of a chancroidal infection should be deferred for at least two or three months after all signs of local infection have completely subsided. The risk of poor healing or reactivation of sluggish organisms in the depths of the tissues if operation is performed earlier is always present.

Fig. 4.—Multiple chancroidal ulcerations in the pubic region; duration four weeks.

Biopsy of genital lesions for diagnosis has been advocated.[15] The histologic differentiation of chancroid from lesions which may simulate it, i. e., lymphogranuloma venereum, granuloma inguinale and syphilis, is difficult. The lesions are all granulomas and depend on the isolation of the individual causative organism for their specific identification. We find that biopsies are essential and of value when bacteriologic methods have failed or when a lesion fails to respond to specific therapy. Whenever the possibility of carcinoma arises biopsy is definitely indicated. In one year, 2 squamous cell carcinomas, 1 of the penis and 1 of the anus, and 2 adenocarcinomas of the rectum were discovered by biopsy. Indiscriminate biopsies, however, are not advisable.

REINFECTION OR RELAPSE

Among 50 patients whose course was followed for two months to three years, 6 had subsequent ulcerations in which Ducrey bacilli were demonstrated. The intervals between the appearance of the successive lesions were in case 1 three weeks, in case 2 seven months, in case 3 four months, in case 4 two and one-half months, in case 5 ten months and in case 6 two years. The subsequent lesions occurred at a site different from the original one in all but case 2. A brief description of cases 1 and 2 follows:

CASE 1.—A Negro youth aged 20, first seen April 29, 1938, was treated successfully with sulfanilamide for two chancroidal lesions on the corona penis. The lesions healed completely in ten days. He returned three weeks later, with a fresh ulceration on the frenulum, admitting unprotected coitus in the interval. This lesion, which showed Ducrey bacilli, likewise healed promptly when sulfanilamide was given orally. The patient has remained well for twenty months.

CASE 2.—A Negro aged 30, first seen March 17, 1939, was successfully treated with sulfanilamide for four ulcerations on the prepuce and bilateral inguinal adenitis of two weeks' duration. The lesions healed in fourteen days. On Oct. 2, 1939, seven months after the original lesions had healed, he returned with a fresh group of five ulcerations on the prepuce, with bilateral suppurative inguinal adenitis of three weeks' duration. The new lesions responded to oral sulfanilamide therapy, which produced healing in sixteen days. The inguinal abscess was absorbed.

In all 6 cases a definite history of repeated unprotected coitus was obtained. In case 1, in which the interval between the appearance of fresh lesions was only three weeks, the possibility of relapse must be considered. The lesion, however, was at a new site, and since it healed the patient has had no further recurrence. In every case the subsequent lesions responded to a second course of therapy and have remained healed. The weight of evidence would seem to indicate that reinfection rather than relapse occurred in all the cases mentioned. There were, however, 2 cases of definite relapse in which sulfathiazole powder applied locally had been used alone and in which the response to oral medication with sulfathiazole was prompt.

TABLE 2.—*Cases of Chancroid Associated with Other Venereal Diseases*

Disease	Total	Cases of One, Two, Three and Four Diseases	%
Chancroid	175	81	46
Chancroid and syphilis	52		
Chancroid and gonorrhea	8		
Chancroid and lymphogranuloma venereum	6	67	39
Chancroid and granuloma inguinale	1		
Chancroid, gonorrhea and lymphogranuloma venereum	2		
Chancroid, syphilis and gonorrhea	8	20	11
Chancroid, syphilis and lymphogranuloma venereum	10		
Chancroid, syphilis, gonorrhea and lymphogranuloma venereum	4		
Chancroid, syphilis, gonorrhea and granuloma inguinale	1	7	4
Chancroid, syphilis, lymphogranuloma venereum and granuloma inguinale	2		
Total	175	175	100

Fig. 5.—The same lesion as in figure 4, five days after sulfanilamide therapy.

ASSOCIATED LESIONS

The presence of more than one venereal disease is not the exception but rather a frequent occurrence. Among 175 patients less than half (46 per cent) appeared with one disease; the remaining 54 per cent had two, three or four venereal infections simultaneously or in quick succession. Among the patients with chancroid associated with syphilis 3 had a primary

15. Pund, E. R.; Greenblatt, R. B., and Hull, G. B.: Histologic Differentiation of Venereal Granuloma, Lymphogranuloma and Chancroid, Am. J. Syph., Gonor. & Ven. Dis. **22**: 495, 1938.

syphilitic chancre. The association is uncommon because of the difference in the incubation periods of the two diseases. A brief description of 3 cases follows:

CASE 1.—A Negro aged 22 had two ulcerations on the prepuce which had not healed for two months. He was found to have two separate ulcerations, one on the frenulum and another on the dorsum of the glans penis. The Wassermann test, dark field examination and Frei test all gave negative results. Sulfanilamide was given orally, and the ulceration on the frenulum healed over within five days. The lesion on the dorsum of the glans penis, however, became more indurated. Another dark field examination revealed T. pallidum.

CASE 2.—A Negro aged 39 was seen on Jan. 19, 1938, with a definite syphilitic chancre; dark field examination gave positive results. He was given six injections of neoarsphenamine, and the chancre healed over within two weeks. However, three more ulcerations on the corona penis, which were also present, began to get larger. These proved to be chancroidal ulcers, which healed promptly with sulfanilamide therapy.

Fig. 6.—The same lesion as in figure 4; there is complete healing fourteen days after sulfanilamide therapy.

CASE 3.—A white man aged 25 was admitted with two dime-sized ulcerations on the frenulum and corona penis of one week's duration. The Wassermann reaction was negative; dark field examination gave negative results; smears for Ducrey organisms were positive. Both ulcerations healed promptly with sulfanilamide therapy in fourteen days. The patient returned two weeks after healing took place with a fresh ulceration on the frenulum, the site of one of his previous ulcerations. Dark field examnation of this lesion revealed T. pallidum. It is most likely that a simultaneous infection took place in this case, since the chancroid appeared within one week and the syphilitic chancre two weeks after the chancroid had healed.

These 3 cases illustrate that while sulfanilamide and its derivatives have no effect on syphilitic lesions, antisyphilitic therapy has no beneficial effect on concomitant chancroidal lesions.

In the treatment of the patient with multiple infections, the simultaneous administration of the arsphenamines, bismuth compounds, tartar emetic and Frei antigen has not produced any untoward toxic effects. Thus combined lesions may be treated at the same time. The known precautions of blood counts, examination of the urine and clinical observations of the patient should certainly be carried out.

Nine patients for whose lesions a definite diagnosis was not possible were given sulfanilamide or a derivative. When no healing of the lesion took place, it was found on further investigation not to be a chancroid.

From the foregoing data it would seem that the use of sulfanilamide and its derivatives is indicated as a therapeutic test. If the lesion fails to heal, other diagnostic means and other therapy should be tried.

SUMMARY AND CONCLUSIONS

1. A series of 175 consecutive ambulatory patients with chancroid infection were treated with sulfanilamide and sulfathiazole.

2. The identification of the Ducrey bacillus on smears stained by the Unna-Pappenheim method (methyl green pyronine) was found to be the most important single diagnostic criterion of chancroidal infection.

3. Ducrey bacilli were identified in 88.5 per cent of the cases in routine smears from chancroidal ulcers.

4. The intradermal reaction to Ducrey vaccine proved to be specific and was found positive in about 95 per cent of cases.

5. The Ducrey vaccine test is more important when the results are negative, to exclude active chancroidal disease. When the reaction is positive it often indicates a past, healed infection.

6. The reaction to Ducrey vaccine remained positive in all cases after complete healing of the active lesion had taken place.

7. Chancroidal buboes were present in about 42 per cent of the cases.

8. Sulfanilamide was administered orally to 150 patients for fourteen days; a total of 45.6 Gm. (760 grains) in divided doses was found adequate.

9. Sulfathiazole was administered orally to 25 patients for ten days; a total of 20 Gm. (300 grains) in divided doses sufficed.

10. All definitely proved chancroidal infections healed with chemotherapy.

11. Surgical measures of any description were contraindicated and found unnecessary.

12. Aspiration of large inguinal abscesses was found sufficient in some cases. Spontaneous absorption of small abscesses took place in 5 cases during chemotherapy.

13. Reinfections occurred in 5 cases, and there was 1 questionable relapse; all the lesions healed promptly with a second course of chemotherapy.

14. Local application of sulfathiazole powder healed superficial chancroidal ulcerations. In 2 patients a relapse occurred, but the lesion responded promptly to oral therapy with sulfathiazole.

15. More than half (54 per cent) of the patients in our series were found to be infected with two, three or four venereal diseases during their observation.

16. Sulfonamide therapy may be used as a therapeutic test in the differential diagnosis of chancroid.

125 Worth Street.

Man Contrives His Own Undoing.—There was a time when men were content to grind their corn and use the flour as it came. It was good flour, but brown. They wanted it white, for reasons of social prestige. . . . So an important part of the grain was removed, just as the husk was removed from the rice by polishing, or as fat is cut from the meat by the butcher, or as much of the value of food is removed by refrigeration, by canning and by various modern devices whereby we make stale food appear fresh. Thus man contrives his own undoing. He pays the miller to remove the best part of the wheat, pays the scientist to find out what he's done, pays the chemist to make it for him again, and pays the miller to put it back. And we say that man's greatest asset in his power of reason.—Atkinson, Miles: Behind the Mask of Medicine, New York, Charles Scribner's Sons, 1941.

PHYSICAL FITNESS OF CHILDREN FROM DIFFERENT ECONOMIC LEVELS IN CHICAGO

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For a number of years the Elizabeth McCormick Memorial Fund has been interested in the accumulation of a body of factual information on the general health and dietary practices of preschool and school age children in the Chicago area. Its regular health education program centers around a periodic examination by a pediatrician, followed by family consultations with a nutritionist. Approximately 1,500 children from six hundred families, largely from the low income levels, are examined each year in connection with this program.

In 1939, with the assistance of the Work Projects Administration,[1] a study was begun of the records of 10,000 children who had been enrolled in the Fund's health supervision classes during the preceding decade, and plans were made for examining during the next two years a large number of children from widely different economic levels. Since then more than 7,200 children from three thousand nine hundred families have been examined with one or both parents present.

This article presents observations on the incidence of certain health problems among 6,438 children who were examined between January 1939 and October 1940. The group was approximately equally divided as to sex: 3,253 boys and 3,185 girls. Their ages at the time of examination ranged from 2 years to 18 years, 88 per cent being between 5 years and 14 years of age.

SELECTION OF CASES AND CHARACTERISTICS OF COMMUNITY AREAS REPRESENTED

Contacts with the families were channeled through the public schools, private nursery schools and district offices of private and public welfare agencies. With the cooperation of the public school authorities, schools in distinctly different types of neighborhoods were selected and all children attending them (and their siblings) were given an opportunity to have the examination. Some of the best and some of the poorest neighborhoods in Chicago, representing various national and racial groups, were included. The proportion of pupils examined in these schools ranged from 33 per cent to 75 per cent of the children attending these schools. In general, parents in the better neighborhoods appeared more interested in having their children given the health check-up than those in poorer districts.

To insure an adequate sample of the relief population, special examining centers were established in settlements and in field houses in the parks. All families on the rolls of the Chicago Relief Administration having preschool or school age children who lived within walking distance of these centers were invited by letter. Examinations were always by appointment and on the condition that a parent would be present.

Districts of the city represented in the study included community areas in which the child population is reported as densest according to the 1934 census data for Chicago.[2] A spot map showing the distribution of the selected neighborhoods is given in figure 1. Schools are indicated on the map by black squares and other centers by black circles. General conditions in these selected areas, as reflected by relief status, color and nativity of the families, and infant mortality and communicable disease morbidity rates,[2] present a wide distribution of economic and health problems. In approximately a fourth of the areas conditions were better than the average for total Chicago and in a fourth of them they were poorer.

The economic status of the families included in the study was determined from information given by the parent with regard to regularity of employment, type of occupation, extent of financial assistance from relatives or agencies, length of time on relief and annual income. Three broad economic categories were used: economically independent, marginal and relief.

Families that reported regular employment with no financial assistance from relatives or agencies during the two years prior to the examination (70 per cent had never received financial assistance) and a stable type of occupation at the time were classified as "economically independent." The majority of the reported incomes ranged from $2,000 to $4,000, 2 per cent being as high as $10,000.

Families that were receiving financial assistance from either private or public agencies at the time of the examination were classified as "relief." The principal sources of relief were, in the order of frequency, Chicago Relief Administration, Mothers' Pension of the Juvenile Court of Cook County and United Charities of Chicago.

The "marginal" class included families not on relief at the time of examination but that were on the WPA rolls or had been on relief at some time during the past two years; families in which there was a history of irregular or seasonal employment or of recent employment after an extended lay-off; families living with relatives or friends and receiving some assistance from them, and families in which the wage earners were employed at low wage levels.

THE PHYSICAL EXAMINATION

Immediately preceding the physical examination a health history of each child was obtained from the parent—usually the mother. This history included information on antepartum care, delivery, infant feeding, general development, health habits and practices, immunization, an account of illnesses and accidents, a detailed inventory on the child's regular dietary and pertinent comments on leisure time activities, attitude toward school and playmates, management difficulties and methods used to control the child. Other information concerned a family history of tuberculosis and diabetes, clinic registrations and facts with regard to living conditions. This history, together with the record of certain body measurements (height, weight and, in some instances, girths) was in the physician's hands at the time the child appeared for the examination.

Young children and boys were examined without clothing; older girls were stripped to the waist. Results were dictated by the physician at the time of examination and recorded by an assistant on a prepared schedule. At the completion of the examination the physician

From the Elizabeth McCormick Memorial Fund.
1. Assistance in the collection and analysis of the data for this report was given by the Work Projects Administration (O. P. 65-1-54-2334).

2. Health Data Book for 75 Local Community Areas of the City of Chicago, Chicago, Chicago Board of Health and Tuberculosis Institute, 1939.

stated his judgment on the child's general health status and listed the specific conditions for which remedial care was recommended. The record was then checked by him for accuracy and the mother was advised as to the child's health needs.

Reports on the physician's recommendations were sent to the medical case workers of the relief agencies involved, and the responsibility for follow-up care was assumed by the agency. Parents in the economically independent and marginal classes were advised to take the child to his private physician for the care recommended.

At the beginning of this study a special effort was made by the medical staff to agree on the meanings of descriptive terms used and the conditions under which certain types of recommendations would be made. All correctable defects were cited, regardless of whether or not there were facilities for taking care of them. For example, the need for orthodontia was indicated wherever it was noted, although it was doubtful whether families on relief or those on low incomes could arrange for this type of care.

Seven physicians participated in the investigation—four regular staff pediatricians and three who were engaged for this special study. The latter spent at least one week in observing and conferring on procedures used by the medical staff and in making examinations under their direction. A few weeks after the program was under way a number of children seen by one pediatrician were reexamined by him and by several other physicians on the same morning. To avoid any misunderstanding, the parents and teachers of the children who were selected for this recheck were informed of the plan and the reasons for it. Each physician was given a complete copy of the child's health history but no information on the previous examination. Variations in observations and ratings and in recommendations were later discussed in conferences and a further effort was made to insure comparable procedures and standards. Schedules were so arranged that each physician saw children from different economic levels.

Body measurements were taken under the personal supervision of a trained anthropometrist. Steel tapes, measuring boards and scales and the technic for using them were checked from time to time to insure comparability of results. Approximately 1 out of every 4 children examined was photographed without clothing or in shorts.

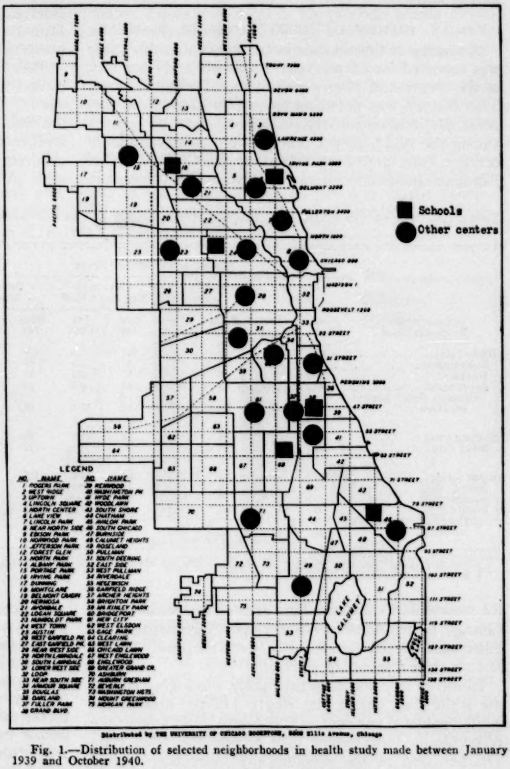

Fig. 1.—Distribution of selected neighborhoods in health study made between January 1939 and October 1940.

NATIONAL ORIGINS, SIZE OF FAMILY AND HOUSING

With few exceptions the children in this study were American born. Thirty-five per cent of them were of native white parentage, which is the proportion reported for total Chicago in the 1934 census. Nineteen per cent were of Negro and 5 per cent were of Mexican parentage.

The size of family varied directly with the economic classification, but large families (8 or more children) were found at all income levels and among both the white and the Negro. The average number of children per family was 3. Among the Mexican families the average was 6 children, but the largest families were noted among the white native born. The range in size of family was from 1 child to 17 children. The largest family in the white economically independent class had 9 children, in the Negro 11.

Children examined were most frequently the first or second born in their families, but 3 per cent were the eighth or later born. All birth orders from first to seventeenth were represented.

The overcrowded conditions under which some of the families lived are strikingly evident in the sleeping arrangements for the children. In some instances as many as 6 children were reported as sleeping in one bed. The degree of crowding has been estimated in two ways: (1) the average number of persons per room in each household and (2) the number of bedfellows with whom the children examined were reported to sleep. Frequencies of various degrees of crowding among the different racial and economic groups are briefly summarized in table 1. Crowding was apparently more common among the families included in this study than

was noted in the sample population of Chicago in the National Health Survey (1935-1936).[3] The National Health Survey reported that 25 per cent of the white families in Chicago were living more than one person per room and 46 per cent of the Negro families. Figures presented in table 1 show this degree of crowding in 35 per cent of the white and 67 per cent of the Negro families. However, these variations are to be expected, since the survey sample included all types of households, and the present study was restricted to those having children.

FAMILY HISTORY OF TUBERCULOSIS OR DIABETES

A history of tuberculosis in the families in this study was reported for 15 per cent of the white, 17 per cent of the Negro and 10 per cent of the Mexican children. This history was noted as frequently among the economically independent class as among those on relief—among the white, 15 per cent in the economically independent class and 14 per cent in the Chicago Relief Administration class; among the Negro, 19 per cent in the economically independent and 15 per cent in the Chicago Relief Administration class. A grandparent or other near relative was reported more frequently in this history than a parent or sibling.

Incidence of diabetes in the family was higher among the white than among the Negro (12 per cent of the white against 8 per cent of the Negro) and among the economically independent than among the relief class (16 per cent of the economically independent white against 8 per cent of the relief). These comparative differences are statistically significant.

CONDITIONS FOUND ON PHYSICAL EXAMINATION

Results of the examinations are presented in terms of conditions requiring remedial professional care, general health ratings and the incidence of certain types of deviations from normal. The types of professional services most frequently needed are summarized in table 2. Figures on the incidence of certain conditions such as poor muscle tone, insufficient fat padding, round shoulders and flaring ribs and low ratings on general physical fitness are given in table 3. The weight status according to percentage deviations from standards for height and age is graphically shown in figure 2.

Medical Care as Related to Economic Status and Color.—Medical care was recommended in cases in which specific conditions were judged to deviate from the normal to the extent that professional remedial services were advisable or in which symptoms or history indicated a need for further examination or treatment.

Types of health problems most frequently noted by the physicians are given in table 2 for white and Negro children according to economic status of the family. Data on the Chicago Relief Administration cases are presented separately in the last two columns of the table.

There is no evidence in these observations of an association between need for medical care and economic status. The outstanding fact indicated is that most of the children examined, regardless of the family income level, needed medical attention. Sixty per cent of the children were in need of medical care, and their parents were so advised by the examiner.

TABLE 1.—*Housing Conditions and Sleeping Arrangements of Chicago Children Examined Between January 1939 and October 1940, According to Color and Economic Class* *

Color and Economic Class	Number of Persons per Room								Number of Persons per Bed					
	One or Less		More than One		More than One and a Half		Two or More		One		Two		Three or More	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
White total	1,592	65.0	606	24.7	131	5.3	123	5.0	1,943	41.4	2,284	48.7	465	9.9
Independent	1,001	82.0	163	13.5	23	1.9	19	1.6	1,364	69.9	525	29.0	20	1.1
Marginal	145	54.8	87	32.8	17	6.4	16	6.1	167	32.7	294	57.6	49	9.6
Relief total	446	45.4	356	36.3	91	9.3	88	9.0	512	21.6	1,465	61.7	396	16.7
Chicago Relief Administration	287	43.6	238	36.1	68	10.3	66	10.1	329	20.3	959	59.2	331	20.5
Mexican total †	27	24.8	44	40.4	17	15.6	21	19.2	61	19.7	158	51.0	91	29.4
Relief total	24	24.1	42	42.4	16	16.2	17	17.3	53	18.7	143	50.5	87	30.8
Negro total	189	33.3	159	27.9	62	10.9	158	27.8	379	31.3	686	56.6	146	12.1
Independent	64	52.0	34	27.6	13	10.6	12	9.8	148	56.1	107	40.5	9	3.4
Marginal	25	32.0	26	33.3	8	10.3	19	24.3	51	33.6	89	58.6	12	7.9
Relief total	100	27.3	99	27.0	41	11.2	127	34.6	180	22.6	490	61.6	125	15.7
Chicago Relief Administration	91	27.8	87	26.6	32	9.8	117	35.8	167	25.3	399	60.4	95	14.4

* Housing index based on number of families; sleeping arrangements on number of children examined.
† Mexican total includes 10 nonrelief families.

Inspection of table 2 shows that a slightly larger proportion of white children in the independent class than in the total relief class required medical attention—59 per cent in the independent and 55 per cent in the relief. Comparisons with the marginal income class suggest that more medical care was needed by this class than by the others, but here again differences are not large—64 per cent of the marginal against 59 per cent of the independent and 55 per cent of the relief class.

Health problems were reported more frequently in the case of Negro than of white children. The incidence was higher in each economic category, the smallest variations occurring in the Chicago Relief Administration comparisons. In the independent class 59 per cent of the white compared with 70 per cent of the Negro were advised to have medical attention, and among the Chicago Relief Administration class 61.5 per cent of the white against 68.7 per cent of the Negro. The evidence here is conclusive.

The results give no indication of an association with nativity of parents. Differences between the white of native born parentage and other white rarely exceeded 1 per cent in either direction. Figures cited in table 2 for total white cases are practically the same as those for native white parentage cases.

3. Adequency of Urban Housing in the United States as Measured by Degree of Crowding and Type of Sanitary Facilities; National Health Survey, Sickness and Medical Care, Bulletin 5, Washington, D. C., U. S. Public Health Service, 1938.

Types of Medical Care Needed.—The remedial services advised by the physicians in their recommendations to the parents were for many different conditions. Those listed in table 2 represent the types of health problems observed in at least 1 out of every 100 children examined. Services most frequently needed were for orthopedic care. Among white children remedial services for abnormalities of posture or defects of the spine were advised in 12 per cent of the children and for abnormalities of the foot in 15 per cent of them.

The second ranking problem of medical care was that of ear, nose and throat conditions. Fourteen per cent of all children examined were in need of this type of medical attention, exclusive of surgery. In approximately 2 per cent of the children this care was advised because of ear conditions. Removal of tonsils and adenoids was recommended only if considered necessary by the pediatrician after a careful review of the history of infections. In 13 per cent of the children having tonsils, removal was advised.

Other problems in order of frequency related to conditions of eyes, skin, genitourinary system, heart and lungs. Remedial services for eyes, ears and nose were judged on inspection at the time of the examination and on the history—the eyes by general inspection, the ears and nose with an otoscope. Tests of visual acuity and of hearing were not made. The incidence of eye conditions needing professional care was 9 per cent; that of heart conditions 2 per cent, and that of lung conditions 2 per cent.

In general, these various types of medical care were needed no less by children from the higher economic level than by those from the low levels. Neither in frequency nor in type is there evidence of a relation between need for care and economic status.

Medical Care as Related to Age Level.—With the exception of eye conditions, incidence of medical attention varied little with age. In the case of eyes, as age increased there was a progressively larger proportion recommended for care. For example, the proportions in the independent class needing attention were 2 per cent at the preschool level, 5 per cent at ages 5-9 years, 10 per cent at ages 10-14 years and 14 per cent at ages 15-19 years; in the relief class these proportions were 2 per cent, 9 per cent, 11 per cent and 15 per cent respectively.

At all age levels the most frequent type of remedial service needed was orthopedic care. Corrections of abnormalities of the foot in the case of white children were recommended at different age levels in the following proportions, ranging from youngest to oldest: 17 per cent, 15 per cent, 13 per cent and 18 per cent.

Ear, nose and throat conditions again rank second in order of frequency, regardless of age level. Figures on recommendations for removal of tonsils and adenoids according to the age of the child differ little from those previously given for total cases. Among white children having tonsils, removal was advised in 9 per cent of the youngest children, 19 per cent of the next age level, 12 per cent of the next older and 8 per cent of those 15 years of age or older. Corresponding percentages for Negro children were 7, 13, 8 and 9.

These results tend to emphasize the widespread need for health service by children of all ages and different income levels.

Dental Care as Related to Economic Status and Color.—The majority of the children in the study (58 per cent) were reported to need dental care, exclusive of prophylaxis, and the lower the economic level the larger the proportion requiring corrective work. Undoubtedly these figures are an underestimation of the actual problem of dental care, since they are based on inspection by a physician rather than by a dentist. They serve to indicate the extensiveness of the problem among different economic classes and all age levels.

Significant differences between the white independent class and the relief class with respect to dental care are clearly indicated. Comparisons with the marginal class likewise show a consistent trend which justifies the conclusion that high incidence of dental defect is associated with low income level. Proportions of white children in each economic class who were advised to have corrections made were 52 per cent in the independent, 59 per cent in the marginal and 68 per cent in the relief—70 per cent in Chicago Relief Administration group.

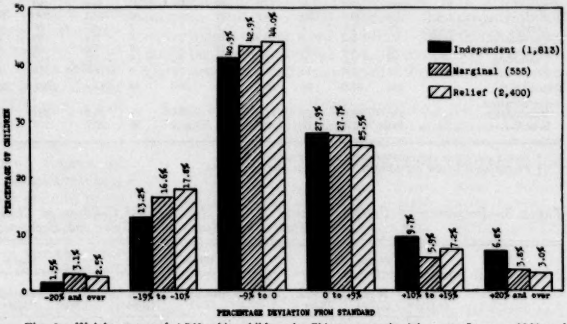

Fig. 2.—Weight status of 4,768 white children in Chicago, examined between January 1939 and October 1940, according to economic class, in terms of percentage deviations from the Baldwin-Wood standard.

These figures include all conditions of teeth judged by the physician to require professional attention.

Decided variations in the teeth of white and Negro children were apparent, a larger proportion of the white at each economic level having dental defects. Among the Negro children, the proportions according to economic class were 37 per cent in the independent, 46 per cent in the marginal and 52 per cent in the relief class. The relation to economic level is suggested, but the differences here are not statistically reliable.

At the time of the examination the physician reported the number of carious teeth observed. Analyses of these records show an average of more than one carious tooth per white child, 45 per cent having at least two teeth with cavities and 4 per cent having as many as eight carious teeth. In each economic class some cases with a large number of dental defects were reported. The averages for white children were as follows: independent class one and thirty-five hundredths carious teeth, marginal two and five hundredths teeth and relief two and three tenths teeth.

Need for dental care was noted at all ages but was least in evidence at the preschool level. Among children under 5 years of age, 23 per cent were reported to have dental defects. At all age levels the association

with economic status was indicated, though the differences were not always large.

Comparisons of white 10 year old children, one of the largest age groups, show an average of one and five tenths carious teeth per child in the independent, one and eighty-eight hundredths in the marginal and two and thirty-eight hundredths in the relief class. The proportions at this age having carious teeth were 56 per cent in the highest economic level and 65 per cent the other extreme, 38 per cent were rated as in relatively poor condition—that is, their health status was definitely unsatisfactory.

In the judgment of the physicians, children from the lower income levels were less robust than those from the economically independent level. Health ratings of those in the independent class show a significantly larger proportion in excellent condition and a smaller proportion in poor condition. Ratings indicative of

TABLE 2.—*Frequency of Certain Types of Health Problems Among 6,053 White and Negro Children in Chicago Examined Between January 1939 and October 1940, According to Economic Class*

Protective and Remedial Health Services Recommended	Independent				Marginal				Total Relief				Chicago Relief Administration			
	White (1,831)		Negro (266)		White (534)		Negro (153)		White (2,456)		Negro (813)		White (1,646)		Negro (668)	
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
None recommended	173	9.4	38	14.3	44	8.2	3	2.0	218	8.9	43	5.3	103	6.3	34	5.1
Medical care	1,083	59.1	187	70.3	344	64.4	118	77.1	1,351	55.0	560	68.9	1,012	61.5	459	68.7
Eyes *	127	6.9	12	4.5	55	10.2	15	9.8	248	10.1	77	9.5	170	10.3	68	10.2
Ears,* nose, throat	258	14.1	39	14.7	81	15.1	28	18.3	338	13.8	129	15.9	278	16.9	122	18.3
Tonsillectomy and adenoidectomy †	129	13.2	17	7.8	85	16.9	9	7.4	241	15.7	75	11.3	201	18.4	34	6.2
Skin	46	2.5	4	1.5	16	3.0	9	5.9	96	3.9	24	3.0	72	4.4	21	3.1
Allergy	39	2.1	0		4	0.7	0		13	0.5	8	1.0	8	0.5	7	1.0
Endocrine	19	1.0	2	0.8	7	1.3	0		10	0.4	4	0.5	10	0.6	4	0.6
Spine	324	17.7	41	15.4	67	12.5	32	20.9	190	7.7	61	7.5	166	10.1	57	8.5
Feet	340	18.6	109	41.0	77	14.4	66	43.1	286	11.6	223	27.4	180	11.5	186	27.8
Lungs	19	1.0	4	1.5	6	1.1	2	1.3	52	2.1	23	2.8	46	2.8	23	3.4
Cardiac	23	1.3	2	0.8	14	2.6	3	2.0	50	2.0	19	2.3	30	1.8	17	2.5
Genitourinary	30	1.6	20	7.5	13	2.4	12	7.8	58	2.4	23	2.8	44	2.7	23	3.4
Urinalysis	28	1.5	8	3.0	12	2.2	6	3.9	37	1.5	23	2.8	33	2.0	23	3.4
Enuresis	23	1.3	12	4.5	20	3.7	6	3.9	73	3.0	36	4.4	64	3.9	31	4.6
Dental care	946	51.6	98	36.8	315	58.9	70	45.8	1,677	68.3	424	52.2	1,156	70.2	348	52.1
Immunization																
Vaccination	370	20.2	58	21.8	132	24.7	31	20.3	468	19.1	215	26.4	334	20.3	171	25.6
Schick	685	37.4	79	29.7	195	36.4	50	32.7	702	28.6	245	30.1	515	31.3	216	32.3

* Based on gross examination—no sensory tests.
† Percentages based on number of children having tonsils.

TABLE 3.—*Frequency of Certain Physical Defects Among 6,385 Children in Chicago, Examined Between January 1939 and October 1940, According to Color and Economic Class*

	Total						White								Negro						Mexican		Chicago Relief Administration					
	White (4,821)		Negro (1,232)		Mexican (332)		Independent (1,831)		Marginal (534)		Total Relief (2,456)				Independent (266)		Marginal (153)		Total Relief (813)		Total Relief (302)		White (1,646)		Negro (668)		Mexican 260)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Muscles flabby	1,207	25.2	375	30.7	82	25.0	456	25.0	159	29.6	592	24.3			78	29.7	72	47.1	225	27.8	74	24.8	400	24.4	165	24.9	57	22.0
Posture poor	2,010	43.9	573	47.5	141	43.3	625	34.3	241	46.3	1,144	48.8			116	45.0	100	66.7	357	44.7	126	42.1	759	47.0	298	44.9	105	40.7
Fat insufficient	1,032	21.6	528	43.1	66	20.1	165	9.0	99	18.5	768	31.6			119	44.9	75	49.0	334	41.4	59	19.6	482	29.5	261	39.4	48	18.5
Mucous membrane pale	877	18.7	356	29.7	35	10.7	296	16.4	119	22.9	462	19.5			88	34.0	64	43.5	204	25.8	30	10.0	254	15.8	157	23.9	26	10.1
Shoulders round	1,501	31.7	354	29.0	91	29.4	526	28.9	178	33.7	797	33.0			89	34.0	61	39.9	204	25.3	86	27.3	590	36.2	188	28.3	84	30.4
Ribs flaring	1,052	22.1	319	26.2	55	17.0	158	8.7	99	18.8	795	33.0			61	22.9	51	34.0	207	25.8	50	17.0	505	31.1	178	26.9	42	16.6
Legs:																												
Bowed	1,906	42.0	708	59.2	144	43.5	483	28.9	215	50.3	1,208	51.4			128	52.5	120	77.4	460	57.8	129	43.0	864	53.4	397	60.4	102	39.4
Knock kneed	663	13.3	150	12.5	59	17.8	163	9.7	84	16.2	356	15.1			23	9.4	18	11.6	109	13.7	54	18.0	206	12.7	86	10.0	47	18.1
Feet:																												
Pronated	648	13.6	423	34.3	48	14.6	231	12.6	83	15.5	334	13.8			131	48.9	69	43.9	223	27.3	45	15.0	199	12.4	179	27.0	32	12.5
Flat	410	8.6	229	18.6	36	11.0	167	9.2	51	9.5	192	7.9			43	16.0	39	24.8	147	18.0	30	10.0	88	5.5	112	16.9	23	9.0
Carious teeth, 2 or more	2,117	44.9	387	31.9	175	53.5	602	33.5	237	45.7	1,278	53.2			48	18.2	45	29.6	294	36.8	166	55.9	907	55.5	244	37.0	148	57.8
Heart:																												
Functional	81	1.7	54	4.4	7	2.1	25	1.4	9	1.7	47	1.9			16	6.0	8	5.3	30	3.7	6	2.0	30	1.8	25	3.8	6	2.3
Organic	35	0.7	12	1.0	3	0.9	8	0.4	5	0.9	22	0.9			1	0.4	1	0.7	10	1.2	3	1.0	9	0.5	8	1.2	3	1.2
Underweight:																												
10 to 14%	507	11.0	193	16.1	27	8.3	167	9.2	60	14.1	280	11.8			30	11.5	26	17.1	140	17.3	23	7.8	200	12.4	112	16.9	21	8.2
15% or more	339	7.3	135	11.1	13	4.0	106	5.8	33	7.7	200	8.5			23	8.9	26	17.1	86	10.7	12	4.1	154	9.6	77	11.6	8	3.2
General condition unsatisfactory or poor	1,744	36.7	569	45.9	122	41.4	383	21.0	211	41.7	1,150	47.7			93	34.9	84	54.5	383	47.9	110	37.3	793	48.6	306	45.8	95	36.5

and 73 per cent in the lower levels. The range was from no caries to eleven affected teeth and was the same for the high and low income classes.

Health Ratings as Related to Economic Status and Color.—Immediately after the examination, the detailed observations were summarized by the physician in the form of a rating, which described his impression of the child's general physical condition. Analyses of these ratings show that only 6 per cent of the children examined were described as in excellent health. At excellent health were three times as frequent at the economically independent level as at the relief level and twice as frequent as at the marginal level. Frequencies of high and low health ratings, which describe the most and least robust, by economic class, are given in table 4.

Differences between the marginal and relief classes were neither consistent in direction nor statistically significant. There is little indication in these ratings that the children in the marginal class were either more or less healthy than children in the relief class.

The trend of the ratings was the same at all age levels, and in the case of children between the ages of 5 years and 14 years the differences are statistically significant. It seems safe to conclude that children in the economically independent class were in better general health than the other children of like ages.

There was no association between high or low ratings in health and differences in age. The physical condition of the young children was considered by the physician as neither better nor poorer than that of the older children. For example, the proportion at each age level rated as in excellent health, in order of increasing age, was 6 per cent, 6 per cent, 7 per cent and 4 per cent.

White children were found to be in better condition than the Negro or Mexican children. Ratings indicative of good health were reported more frequently in the case of white children and poor conditions less often than in either of the other groups.

Incidence of Certain Physical Conditions.—Comparative results on the incidence of certain physical deviations from normal are summarized in table 3. The first section of the table reports incidence of the conditions among white, Negro and Mexican children without regard to economic status. The center sections present the data according to economic level. In the last section results are shown for the Chicago Relief Administration group.

The high frequencies noted, among both white and Negro children from different economic classes, of flabby muscles, poor posture, round shoulders, bow legs, defective feet and carious teeth offer definite proof of the unsatisfactory physical condition of a large proportion of these urban children. In at least 1 out of every 4 children examined, regardless of the economic level of the family, some of these defects were observed.

Defects of teeth outrank all other physical deviations among the children in this study, but the incidence of many others is high. In order of frequency, exclusive of teeth, the most common conditions were bow legs 45 per cent, poor posture 44 per cent, round shoulders 31 per cent, flabby muscles 26 per cent, deficient fatty tissue 26 per cent, flaring ribs 23 per cent and pale mucous membrane 20 per cent. The figures cited for bow legs represent various degrees of bowing, relatively few cases showing an extreme degree.

A number of these conditions appeared to be associated with the economic level, but on the whole the incidence was high in each income class. The results with respect to fatty tissue in the case of white children clearly warrant the conclusion that a deficiency in fat padding was most frequent at the lowest income level and least frequent at the economically independent level.

Underweight in Relation to Economic Status and Age Level.—A distribution of weight status in terms of percentage deviations from expected weight for age, sex and height, according to Baldwin-Wood tables, is presented in figure 2 for white children at different economic levels. Cases exactly at standard (zero deviations) have been thrown half to the underweight and half to the overweight frequencies. Inspection of the graph will show that the weight status of approximately a fourth of the children is suggestive of poor nutrition—they were underweight 10 per cent or more or overweight 20 per cent or more.

Analyses of the underweight children (those 10 per cent or more below the norm) reveal a significantly smaller proportion in the independent class below standard than in the other economic classes. While the comparative differences are not large, they give evidence of the higher incidence of underweight at the low income levels than at the economically independent level. The trend of these results is in agreement with that indicated in the doctor's reports on insufficient fat padding.

Among the total children examined 20 per cent were found to be underweight; among the economically independent class 16 per cent and among children in the Chicago Relief Administration class 22 per cent. While the standards used are open to criticism from a number of standpoints, in the light of figures from other investigations based on the same standards the present results are probably an underestimation of the extent to which the children in this study deviated from an optimum condition.

Within the age range which included the majority of the children (2-14 years) there is a systematic increase with advancing years in the proportion of underweight among white children. Differences are not large but are progressive and, in the case of the relief class, are statistically significant. For example, in the white relief class, 6 per cent of preschool age children were underweight, 16 per cent of those in the 5 to 9 year age level and 24 per cent of those 10 years and over. No consistent trend was observable in the results on Negro children.

TABLE 4.—*Percentage of Children Having High and Low Health Ratings According to Color and Economic Class*

	High Health Ratings		Low Health Ratings	
	White	Negro	White	Negro
Economically independent	13.4%	8.6%	21.0%	34.9%
Marginal	4.9%	3.9%	41.7%	54.5%
Relief total	3.4%	2.0%	47.7%	47.9%

At all age levels and in all groups a larger proportion of girls than boys was underweight. In the total group, 25 per cent of the girls and 15 per cent of the boys were as much as 10 per cent below the expected weight standard.

ILLNESS AS RELATED TO ECONOMIC STATUS

A history of illnesses and accidents together with comments from the mother on severity and age at the time of the illness was obtained prior to the physician's examination. A check list of diseases was used to assist the mother in recalling the history. Questions on the frequency of colds, coughs, sore throat, headaches, constipation and nervous habits were included.

Analyses of the records on illness indicated an average of three different types of sickness episodes per child in each economic class and racial group. The results yield no evidence of a greater amount of sickness among the children from the low income levels. Among 10 year old white children 11 per cent were reported to have had six or more illnesses—the proportion in the economically independent class was 14 per cent, that in the relief class 7 per cent.

Injuries by an accident of some type were reported in 18 per cent of the cases, the figures being identical for white and Negro and practically the same for all economic classes. Approximately half of the children

had had a surgical operation—57 per cent of the white and 42 per cent of the Negro children.

As would be expected, removal of tonsils and adenoids was the most frequent type of operation reported. The proportion in the white group having had this type of operation was 40 per cent, in the Negro group 18 per cent; among the Chicago Relief Administration cases the figures were 33 per cent in the white group and 18 per cent in the Negro; among the marginal class 32 per cent in the white and 20 per cent in the Negro group. The incidence of removal of tonsils and adenoids among white children 10 to 14 years of age varied directly with economic status, but only in comparisons of the independent with the relief class is the difference statistically significant.

A history of frequent colds, coughs or sore throats was reported in a third of the cases. The incidence did not appear to be related to economic level or color. The proportions having this history were as follows: in the independent class, 31 per cent of the white and 40 per cent of the Negro children; in the marginal class, 33 per cent of the white and 38 per cent of the Negro; in the Chicago Relief Administration class, 35 per cent of the white and 33 per cent of the Negro.

Records on nervous habits among these children give no indication of differences between the economic classes with respect to incidence of enuresis, nail biting, speech difficulties or like habits. The majority of the children in each income class and racial group had no history of these conditions. The frequency in percentage among white children as reported by the mothers is given in table 5.

IMMUNIZATION STATUS AS RELATED TO ECONOMIC LEVEL AND AGE

The need for immunization was estimated on the basis of the physicians' recommendations concerning smallpox vaccination and the Schick test. Inspection of the records showed that 21 per cent of the children in the study had not been vaccinated and 34 per cent had not been immunized against diphtheria.

The incidence of the need for immunization was closely associated with age, recommendations for this protection being most frequent at the younger ages. Among children under 5 years of age 55 per cent had not been vaccinated and 29 per cent had not been immunized against diphtheria. At ages 10 years and older the figures were 13 per cent needing smallpox vaccination and 34 per cent the Schick test.

TABLE 5.—*Incidence of Nervous Habits in White Children of Different Economic Classes*

	Economically Independent (1,827)	Marginal (557)	Chicago Relief Administration (1,606)
Enuresis	10.1%	16.2%	15.4%
Nail biting	26.9%	25.6%	22.7%
Speech difficulties	10.7%	9.0%	6.3%
Other habits	23.0%	16.4%	12.7%

At the relief level a much larger proportion of the children were not made immune to smallpox or diphtheria than at the higher income levels. The figures with respect to children under 5 years of age according to economic class are given in table 6.

These results are disappointing in the light of the active campaign carried on in Chicago over a number of years for the immunization of preschool and school children. The results are, however, in agreement with reports from other public health programs. In a recent evaluation of a six year program in Tennessee [4] in which preschool immunization was emphasized, the results from the last year (1936) show that 43 per cent of the white 6 and 7 year old children at the time of their first examination had not been immunized against diphtheria. During the entire period of preschool supervision, only 31 per cent of the white children of these ages on entering school were found to have been vaccinated against smallpox.

TABLE 6.—*Percentage of Children Under 5 Years of Age in Need of Immunization Against Smallpox and Diphtheria, According to Economic Class*

	Smallpox Vaccination Advised	Schick Test Advised
Economically independent	44%	20%
Marginal	43%	29%
Relief total	71%	37%
Chicago Relief Administration	74%	41%

DIETARY PRACTICES IN RELATION TO ECONOMIC STATUS AND COLOR

A detailed account of the findings on dietary practices of the children included in this study is to be reported in the near future. As they are definitely a part of the health picture presented in this paper, the trend of the data with little explanation of the technic employed will be given at this time.

Adequacy of protective foods in the diet was evaulated in terms of the number of weekly servings of these foods. Classifications were based on the four diet levels outlined by the U. S. Department of Agriculture (1936),[5] namely (1) liberal diet, (2) moderate cost adequate diet, (3) minimum cost adequate diet and (4) restricted diet for emergency use. In this study diets below the restricted diet level were treated as a fifth classification. Attention should be called to the fact that diet levels 3 and 4 are both below the recommended dietary allowances of the Committee on Food and Nutrition of the National Research Council (1941).

The level of the diet was closely associated with the economic status. Poor diets were found more frequently in the relief class than in the higher income classes and good diets much less often. The figures with respect to weekly servings of fruits and vegetables, including potatoes, offer striking evidence of this relationship. Diets having less than the minimum of eighteen servings of these foods a week, which is below the level of the restricted diet for emergency use, were noted in the following proportions: independent class 10 per cent, marginal income class 32 per cent, Chicago Relief Administration class 64 per cent.

In general, the diets of Negro children were less adequate than those of white children. Variations were consistent and statistically significant at different economic levels, but the differences were greater at the higher levels. Records on consumption of fruits and vegetables, including potatoes, show the following proportion below the minimum standard: independent—white 8 per cent and Negro 23 per cent; marginal—white 25 per cent and Negro 46 per cent; Relief Administration—white 62 per cent and Negro 69 per cent.

4. Walker, W. F., and Randolph, Carolina R.: School Health Services; A Study of the Programs Developed by the Health Departments in Six Tennessee Counties, Commonwealth Fund, 1941, pp. 119 and 120, tables 87 and 88.

5. Carpenter, Rowena Schmidt, and Stiebeling, Hazel K.: Diets to Fit the Family Income, U. S. Department of Agriculture, Farmers' Bulletin 1757, 1936.

The results clearly reflect the need for health education among the urban families included in this study. It is significant that, when judged on a standard currently considered very low, namely restricted diet for emergency use, 10 per cent of the children in families who could afford to buy adequate amounts of fruits and vegetables were getting them in amounts below this level, which is not sufficient to maintain good health. When compared with the dietary allowances of the Committee on Food and Nutrition, the fruit and vegetable intake of more than half of the children (51 per cent) from these economically independent families was found to be below the recommended allowances.

SUMMARY AND CONCLUSIONS

Analyses of the health records of 6,438 children representing widely different income levels and various types of community areas in Chicago, who were examined by pediatricians in 1939 and 1940, furnish factual evidence on the extensiveness of the health problem at different economic levels. The results on physical fitness may be briefly summarized as follows:

1. Need for professional health services:

(*a*) Children from nonrelief families were no less in need of professional care than those from relief families.

(*b*) Variations between the different income levels with respect to incidence and type of medical care needed were small and not statistically significant.

(*c*) The incidence of health services advised by the physicians was as follows:

(1) Sixty per cent of the children were in need of medical care.

(2) Fifty-eight per cent of them were in need of dental care (according to observations of pediatricians).

(3) Thirty-four per cent had not been immunized against diphtheria (29 per cent of the children under 5 years of age).

(4) Twenty-one per cent had not been vaccinated against smallpox (55 per cent of the children under 5 years of age).

2. Association of low income with poor physical conditions which may not have required professional services:

(*a*) Ratings indicative of poor general health were reported more frequently and of good health less often in the lower income classes.

(*b*) The incidence of carious teeth was higher at the lower income levels.

(*c*) Underweight was noted more frequently in the low income classes.

(*d*) Observations of insufficient amount of fat padding, poor posture, round shoulders, flaring ribs and bow legs was more frequent at the low income levels.

3. Health differences between white and Negro children:

(*a*) A larger proportion of the Negro than of the white children were in need of medical care.

(*b*) Ratings indicative of poor general health were reported more frequently and of good health less frequently in the case of Negro than of white children.

(*c*) The incidence of underweight and of other signs of unsatisfactory physical condition was higher in the Negro than in the white group.

4. Adequacy of diet:

(*a*) Adequacy of diet was directly associated with economic status. Poor diets were more frequent at the lower levels and good diets at the higher income levels.

(*b*) The intake of fruits and vegetables was inadequate at all income levels—39 per cent of the children were having less than the minimum requirements for the protection of health.

(*c*) Inadequate diets were noted more often among the Negro than among the white children.

Evidence of the need for health supervision and health education at all economic levels is strikingly shown by the results of this study. Poor nutrition is clearly manifest in a composite of flabby muscles, underweight, pale mucous membranes, round shoulders, fatigue posture, bow legs, knock knees, flat feet, carious teeth and inadequate diets. At no income level is the general health picture satisfactory, but at the low levels it is definitely unsatisfactory.

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FOCAL INFECTION

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For a long time it had been recognized that acute inflammatory disease in a certain region of the body could produce secondary inflammation in some other region. Nevertheless, it was not until after the work of Billings and his co-workers that the conception that chronic, often symptomless, infections of low grade, localized in various parts of the body, could produce disease elsewhere in the body, began to receive general recognition from members of the medical and dental profession in this country. Rosenow[1] stated "The scope of this influence may be judged by the voluminous literature on focal infection that has appeared [since the publications of Billings] throughout the whole civilized world, and in which striking benefit to patients suffering from various diseases and also failure of others to improve have been reported." Although earlier diligence was directed largely to the reporting of the "striking benefits," there has lately appeared a tendency to focus the regard on the "failure of others to improve." This tendency seems to have reached a culmination in the recent paper of Reimann,[2] in which he found no evidence to support the conception that such an entity as focal infection exists.

Although it is admittedly difficult clinically to distinguish sharply the stage in which chronicity begins, there seems to be a tendency on the part of physicians to admit the validity of the conception of acute foci of infection without demur. There also seems to be great reluctance on the part of some investigators to admit that toxins or bacteria from a site of long-standing infection can enter the circulatory system to set up secondary disease in other regions. The explanation for this suggested difference in bodily reaction does not seem to have been satisfactorily explained by the opponents of the theory of "focal infection."

Read before the New England Otolaryngological Society, Boston, Jan. 8, 1941.
From the Division of Medicine (Drs. Slocumb and Binger), the Section on Cardiology (Dr. Barnes) and the Section on Otolaryngology and Rhinology (Dr. Williams), Mayo Clinic.

1. Rosenow, E. C.: Focal Infection and Elective Localization, Internat. Clin. **2**: 29-64 (June) 1930.

2. Reimann, H. A., and Havens, W. P.: Focal Infection and Systemic Disease: A Critical Appraisal; the Case Against Indiscriminate Removal of Teeth and Tonsils, J. A. M. A. **114**: 1-6 (Jan. 6) 1940.

There are probably few physicians who have not observed a sudden and puzzling relief of a patient's symptoms following removal of a "chronic" focus of infection. Such improvement may occur with sufficient infrequency, however, to justify recent expressions of doubt as to the etiologic significance of the focus and also doubt as to whether or not a causal relationship had existed between the focus of infection and the disease which apparently yielded to the therapeutic procedure.

Although bacteriologists [3] have been extremely critical of proof obtained on the basis of clinical evidence alone, the debate and controversy arising from their several attempts to conclude the discussion of focal infection by exact scientific methods constrain us to avoid this particular aspect of the subject and to attempt evaluation of the conception of focal infection on the basis of clinical observations alone. To do this we feel that we must limit ourselves to observations of certain well defined disease entities and attempt evaluation of such clinical improvement as may or may not seem to have occurred following removal of a focus or foci of infection. We shall confine ourselves to a consideration of the effects of removal of such foci of infection as occur in the field of otolaryngology and we shall try to assess the effect of removal of foci of infection in heart disease, chronic infectious arthritis and glomerulonephritis, since these three conditions are representative of those in which removal of foci of infection has been said to be of clinical benefit.

HEART DISEASE

For the purpose of the present consideration, heart disease has been subdivided into several clinical entities.

Coronary Sclerosis.—This condition, depending as it does on certain irreversible changes in the walls of the coronary arteries, would seem to us to be unlikely to be diminished by removal of foci. The thesis that toxic absorption from foci of infection over a long period can produce such chronic degenerative changes as sclerosis of the coronary vessels is impossible either to prove or disprove on the basis of data available. Coronary thrombosis,[4] it has been suggested, in certain instances may have a bacterial background and if so would then seem to depend on transient bacteremia [5] such as is associated with acute infections of the upper part of the respiratory tract, and on acute exacerbations of chronic foci of infection somewhere in the organism.

Hypertensive Heart Disease.—This condition has been the subject of much clinical discussion and experimentation since the work of Goldblatt and may be considered to be in a state of flux. It will not be considered in this paper.

Syphilitic Carditis.—This disease has a well authenticated cause; thus it can be eliminated readily as a product of focal infection.

Acute Pericarditis.—This condition is usually bacterial in origin and in all probability depends for its appearance on the presence of transient bacteremias [6] from acute and possibly chronic foci.

Chronic Pericarditis.—Chronic pericarditis is the end result of an infection rather than an active process itself and can be dismissed from consideration herein.

Cor Pulmonale.—Where cor pulmonale (or dilatation of the right side of the heart secondary to obstruction of the pulmonary circulation) depends for its origin on chronic asthma with secondary emphysema, it obviously cannot be caused by focal infection. When chronic emphysema is secondary to chronic bronchitis, however, the role possibly played by infection in the tonsils and paranasal air spaces cannot be dismissed so summarily. Larsell and Fenton,[7] in demonstrating the lymphatic connections between the paranasal sinuses, the tonsils and the peribronchial lymph nodes, suggested an etiologic relationship between chronically infected tonsils or sinuses and the ultimate development of chronic infection of the tracheobronchial tree. Elimination of such a focus of infection must be obtained before an irreversible process, such as emphysema with pulmonary hypertension, has taken place, because elimination of the focus of infection after the development of such a symptom complex could offer but little toward amelioration of the condition.

Rheumatic Carditis.—The evidence for and against focal infection as an etiologic agent in rheumatic carditis must be considered carefully, because the earlier enthusiasm displayed by some investigators for such a relationship seems to have subsided. In reviewing earlier literature on the influence of tonsillectomy on the recurrence of rheumatic fever, Cohn suggested that the period of observation following operation usually was too short to allow adequate evaluation of results, since it had been found that the percentage of recurrence increases with the passage of time. May Wilson [8] in her recent monograph included a careful study of 413 rheumatic children, 247 of whom had tonsils removed either before or after the first rheumatic infection. The remaining 166 children served as controls. Wilson came to the conclusion that removal of the tonsils seems to have no effect on either the appearance or the recurrence of rheumatic activity. It seemed to her that the value of tonsillectomy for rheumatic children was proportional to its influence on the general health of the child. Our own opinion concerning the influence of the tonsils on rheumatic fever is in accord with that of Wilson.

On the basis of our clinical experience we feel, therefore, that in heart disease focal infection can be considered to be a factor only in an occasional case of coronary thrombosis or acute pericarditis, and in the small group of cases in which emphysema and pulmonary hypertension result from chronic bronchitis secondary to infection in tonsils or sinuses.

We also believe that, in the presence of an old valvular lesion, removal of septic tonsils (especially following quinsy), removal of badly infected teeth or drainage of seriously diseased sinuses must be done with circumspection. Elliott [9] has shown that surgical intervention in very marked foci of infection might produce bacteremia which, exerting an adverse effect on an injured valve, might be the starting point for subacute bacterial endocarditis. The practice of preceding surgical intervention with infections in the presence of chronic valvular injury with chemotherapy by sulfonamide compounds can be recommended, we believe, on theoretical, experimental and clinical grounds.

3. Rosenow, E. C., quoted by Reimann and Havens.[2]
4. Rosenow, E. C.: A Bacteriologic Study of Pulmonary Embolism, J. Infect. Dis. **40**: 389-398 (March) 1927.
5. Oille, J. A.; Graham, Duncan, and Detweiler, H. K.: Streptococcus Bacteremia in Endocarditis, J. A. M. A. **65**: 1159-1163 (Oct.) 1915.
6. Libman, Emanuel: Consideration of the Prognosis in Subacute Bacterial Endocarditis, Am. Heart J. **1**: 25-40 (Oct.) 1925.
7. Larsell, Olof, and Fenton, R. A.: Lymphatic Pathways from the Nose: Research Report, Arch. Otolaryng. **24**: 696-713 (Dec.) 1936.
8. Wilson, May G.: Rheumatic Fever: Studies of the Epidemiology, Manifestations, Diagnosis and Treatment of the Disease During the First Three Decades, London, Commonwealth Fund, 1940.
9. Elliott, S. D.: Bacteremia and Oral Sepsis, Proc. Roy. Soc. Med. **32**: 747-754 (May) 1939.

CHRONIC INFECTIOUS ARTHRITIS

In chronic infectious arthritis a condition of admittedly unknown causation is encountered. Hench[10] summarized all the arguments which have been made for and against the microbic theory of origin of this disease. He found that the argument in favor of the theory rested on twenty-one points, each of which for reasons given was discounted by opponents of the theory. Hench formed two conclusions, one on the basis of his work as a clinical investigator, the other on his experience and needs as a practicing physician. "As a clinical investigator," he wrote, "I must conclude that the cause of atrophic arthritis is still unknown and that the evidence for infection, although very impressive, is incomplete. Invoking the privileges of a clinical investigator I cannot and need not now decide for or against the microbic theory with any finality. As a practicing physician, however, I cannot wait until the evidence is complete. The exigencies of practice force one to express an opinion one way or another. . . . Therefore, as a practicing clinician I have committed myself to the microbic theory." With this statement we are in accord.

It is our opinion that the treatment of chronic infectious arthritis should be individualized. A systemic disease, "it is no more a disease of joints than typhoid fever is a disease of Peyer's patches" (Pemberton). No single form of treatment is adequate, and in evaluating the results of treatment the physician must rely on objective improvement rather than on the patient's subjective relief, lest he be misled by the psychic effects on the patient inherent in any therapeutic measure.

Many physicians regard elimination of foci of infection as the measure of first importance in treatment.[11] Others have not been favorably impressed by results of removal of such foci. Miller[12] believed that the removal of foci was included with other therapy, a practice which clouded the issue. He considered it unfortunate that removal of chronic foci of infection should be considered by so many physicians or investigators to be the first and major treatment, since this procedure had resulted in the loss of much valuable time which might have been used more profitably in other directions.

However, the fact that removal of chronic foci of infection is not followed by rapid or notable relief does not invalidate the importance of eradication of such foci. Several workers have insisted that results of removal of foci of infection may be poor because often more than one focus is present. Foci are too often imperfectly removed, and indeed it is impossible to eradicate them if the focus is not local but is diffuse (for example, nasopharyngitis). Last, too much may be expected of removal of foci of infection in the presence of irreversible articular pathologic change.

Buckley[13] at times noted most remarkable improvement, and even cure, to result from removal of foci and expressed the belief that following removal of foci of infection complete recovery has occurred a sufficient number of times to indicate that such foci may be of etiologic importance in arthritis. The changing views of one authority on arthritis were reported by Cecil and Angevine.[14] In 1927 Cecil and Archer[15] reviewed 200 cases of chronic infectious arthritis in which focal infection seemed to play a major role in the causation of the disease. In 1938, however, in an analysis of 200 new cases of rheumatoid arthritis, Cecil and Angevine came to the conclusion that although undoubtedly there are instances of chronic infectious arthritis which result from focal infection as far as typical rheumatoid arthritis is concerned, it would appear that chronic focal infection plays a comparatively unimportant role. In the same year in a quarter-century survey of focal infection, Bierring[16] approved the more conservative attitude which has developed with reference to hasty diagnostic conclusions and radical removal of suspected foci of infection, but he considered that clinical and bacteriologic evidence had afforded definite confirmation of the fundamental conception of focal infection and felt that perchance focal infection may yet become the medical guide of the future.

On the basis of our own experience, we feel that, given a patient who has chronic infectious arthritis and in whom a definite focus is present, the focus should be eradicated as soon as the patient's general condition warrants surgical treatment. The decision as to the optimal time to remove a focus should rest with the clinician rather than with the laryngologist. Although we feel that focal infection should be eliminated as early as possible when chronic infectious arthritis is present, we prefer a period of observation to elapse before surgical intervention is attempted, so that we can be sure that progression of symptoms is under control. We prefer that the patient's condition is such that fever is absent or slight, that anemia is improving and that loss of weight has ceased. With attention to these factors, we rarely encounter a flare-up in symptoms of chronic infectious arthritis after surgical elimination of a focus of infection has been carried out. Although it is admittedy impossible to assess accurately the improvement produced by removal of a focus of infection from a patient who, at the same time, is receiving other forms of therapy, we believe that we can expect real diminution in symptoms of definite clinical importance to result from such removal for 5 per cent of patients whose infected tonsils are the only discoverable focus. The same results can be obtained for approximately 4 per cent of patients whose sinusitis seems to be the source of infection.

We encounter many patients who report diminution in symptoms of chronic infectious arthritis after any type of surgical intervention or even general anesthesia has been carried out, but the improvement persists for from three to seven days and then is gradually lost. Improvement which we feel to be of clinical importance is pronounced and is maintained permanently following surgical eradication of a given focus. For the remainder of the patients the operation is of value only for the effect it may have in improvement of the general health of the patient.

GLOMERULONEPHRITIS

Because many of the toxins which develop in the body as results of human or bacterial metabolism are eliminated through the kidney, it might be expected that if the conception of focal infection had an actual

10. Hench, P. S.: Is Rheumatoid (Atrophic) Arthritis a Disease of Microbic Origin? A Summary of the Arguments For and Against the Infectious Theory, in A Survey of Chronic Rheumatic Diseases, London, Oxford University Press, 1938, pp. 35-62.
11. Irons, E. E.: Chronic Arthritis, a General Disease Requiring Individualized Treatments, Ann. Int. Med. **9**: 1658-1663 (June) 1936.
12. Miller, J. L.: A Critical Review of the Literature on Chronic Rheumatism, Arch. Int. Med. **57**: 213-234 (Jan.) 1936.
13. Buckley, C. W.: Prognosis in Arthritis, Lancet **1**: 1023 (May 2), 1081 (May 9) 1936.
14. Cecil, R. L., and Angevine, D. M.: Clinical and Experimental Observations on Focal Infection, with an Analysis of 200 Cases of Rheumatoid Arthritis, Ann. Int. Med. **12**: 577-584 (Nov.) 1938.
15. Cecil and Archer, quoted by Cecil and Angevine.[14]
16. Bierring, W. L.: Focal Infection: Quarter Century Survey, J. A. M. A. **111**: 1623-1627 (Oct. 29) 1938.

There are probably few physicians who have not observed a sudden and puzzling relief of a patient's symptoms following removal of a "chronic" focus of infection. Such improvement may occur with sufficient infrequency, however, to justify recent expressions of doubt as to the etiologic significance of the focus and also doubt as to whether or not a causal relationship had existed between the focus of infection and the disease which apparently yielded to the therapeutic procedure.

Although bacteriologists [3] have been extremely critical of proof obtained on the basis of clinical evidence alone, the debate and controversy arising from their several attempts to conclude the discussion of focal infection by exact scientific methods constrain us to avoid this particular aspect of the subject and to attempt evaluation of the conception of focal infection on the basis of clinical observations alone. To do this we feel that we must limit ourselves to observations of certain well defined disease entities and attempt evaluation of such clinical improvement as may or may not seem to have occurred following removal of a focus or foci of infection. We shall confine ourselves to a consideration of the effects of removal of such foci of infection as occur in the field of otolaryngology and we shall try to assess the effect of removal of foci of infection in heart disease, chronic infectious arthritis and glomerulonephritis, since these three conditions are representative of those in which removal of foci of infection has been said to be of clinical benefit.

HEART DISEASE

For the purpose of the present consideration, heart disease has been subdivided into several clinical entities.

Coronary Sclerosis.—This condition, depending as it does on certain irreversible changes in the walls of the coronary arteries, would seem to us to be unlikely to be diminished by removal of foci. The thesis that toxic absorption from foci of infection over a long period can produce such chronic degenerative changes as sclerosis of the coronary vessels is impossible either to prove or disprove on the basis of data available. Coronary thrombosis,[4] it has been suggested, in certain instances may have a bacterial background and if so would then seem to depend on transient bacteremia [5] such as is associated with acute infections of the upper part of the respiratory tract, and on acute exacerbations of chronic foci of infection somewhere in the organism.

Hypertensive Heart Disease.—This condition has been the subject of much clinical discussion and experimentation since the work of Goldblatt and may be considered to be in a state of flux. It will not be considered in this paper.

Syphilitic Carditis.—This disease has a well authenticated cause; thus it can be eliminated readily as a product of focal infection.

Acute Pericarditis.—This condition is usually bacterial in origin and in all probability depends for its appearance on the presence of transient bacteremias [6] from acute and possibly chronic foci.

Chronic Pericarditis.—Chronic pericarditis is the end result of an infection rather than an active process itself and can be dismissed from consideration herein.

Cor Pulmonale.—Where cor pulmonale (or dilatation of the right side of the heart secondary to obstruction of the pulmonary circulation) depends for its origin on chronic asthma with secondary emphysema, it obviously cannot be caused by focal infection. When chronic emphysema is secondary to chronic bronchitis, however, the role possibly played by infection in the tonsils and paranasal air spaces cannot be dismissed so summarily. Larsell and Fenton,[7] in demonstrating the lymphatic connections between the paranasal sinuses, the tonsils and the peribronchial lymph nodes, suggested an etiologic relationship between chronically infected tonsils or sinuses and the ultimate development of chronic infection of the tracheobronchial tree. Elimination of such a focus of infection must be obtained before an irreversible process, such as emphysema with pulmonary hypertension, has taken place, because elimination of the focus of infection after the development of such a symptom complex could offer but little toward amelioration of the condition.

Rheumatic Carditis.—The evidence for and against focal infection as an etiologic agent in rheumatic carditis must be considered carefully, because the earlier enthusiasm displayed by some investigators for such a relationship seems to have subsided. In reviewing earlier literature on the influence of tonsillectomy on the recurrence of rheumatic fever, Cohn suggested that the period of observation following operation usually was too short to allow adequate evaluation of results, since it had been found that the percentage of recurrence increases with the passage of time. May Wilson [8] in her recent monograph included a careful study of 413 rheumatic children, 247 of whom had tonsils removed either before or after the first rheumatic infection. The remaining 166 children served as controls. Wilson came to the conclusion that removal of the tonsils seems to have no effect on either the appearance or the recurrence of rheumatic activity. It seemed to her that the value of tonsillectomy for rheumatic children was proportional to its influence on the general health of the child. Our own opinion concerning the influence of the tonsils on rheumatic fever is in accord with that of Wilson.

On the basis of our clinical experience we feel, therefore, that in heart disease focal infection can be considered to be a factor only in an occasional case of coronary thrombosis or acute pericarditis, and in the small group of cases in which emphysema and pulmonary hypertension result from chronic bronchitis secondary to infection in tonsils or sinuses.

We also believe that, in the presence of an old valvular lesion, removal of septic tonsils (especially following quinsy), removal of badly infected teeth or drainage of seriously diseased sinuses must be done with circumspection. Elliott [9] has shown that surgical intervention in very marked foci of infection might produce bacteremia which, exerting an adverse effect on an injured valve, might be the starting point for subacute bacterial endocarditis. The practice of preceding surgical intervention with infections in the presence of chronic valvular injury with chemotherapy by sulfonamide compounds can be recommended, we believe, on theoretical, experimental and clinical grounds.

3. Rosenow, E. C., quoted by Reimann and Havens.[2]
4. Rosenow, E. C.: A Bacteriologic Study of Pulmonary Embolism, J. Infect. Dis. **40**: 389-398 (March) 1927.
5. Oille, J. A.; Graham, Duncan, and Detweiler, H. K.: Streptococcus Bacteremia in Endocarditis, J. A. M. A. **65**: 1159-1163 (Oct.) 1915.
6. Libman, Emanuel: Consideration of the Prognosis in Subacute Bacterial Endocarditis, Am. Heart J. **1**: 25-40 (Oct.) 1925.
7. Larsell, Olof, and Fenton, R. A.: Lymphatic Pathways from the Nose: Research Report, Arch. Otolaryng. **24**: 696-713 (Dec.) 1936.
8. Wilson, May G.: Rheumatic Fever: Studies of the Epidemiology, Manifestations, Diagnosis and Treatment of the Disease During the First Three Decades, London, Commonwealth Fund, 1940.
9. Elliott, S. D.: Bacteremia and Oral Sepsis, Proc. Roy. Soc. Med. **32**: 747-754 (May) 1939.

CHRONIC INFECTIOUS ARTHRITIS

In chronic infectious arthritis a condition of admittedly unknown causation is encountered. Hench[10] summarized all the arguments which have been made for and against the microbic theory of origin of this disease. He found that the argument in favor of the theory rested on twenty-one points, each of which for reasons given was discounted by opponents of the theory. Hench formed two conclusions, one on the basis of his work as a clinical investigator, the other on his experience and needs as a practicing physician. "As a clinical investigator," he wrote, "I must conclude that the cause of atrophic arthritis is still unknown and that the evidence for infection, although very impressive, is incomplete. Invoking the privileges of a clinical investigator I cannot and need not now decide for or against the microbic theory with any finality. As a practicing physician, however, I cannot wait until the evidence is complete. The exigencies of practice force one to express an opinion one way or another. . . . Therefore, as a practicing clinician I have committed myself to the microbic theory." With this statement we are in accord.

It is our opinion that the treatment of chronic infectious arthritis should be individualized. A systemic disease, "it is no more a disease of joints than typhoid fever is a disease of Peyer's patches" (Pemberton). No single form of treatment is adequate, and in evaluating the results of treatment the physician must rely on objective improvement rather than on the patient's subjective relief, lest he be misled by the psychic effects on the patient inherent in any therapeutic measure.

Many physicians regard elimination of foci of infection as the measure of first importance in treatment.[11] Others have not been favorably impressed by results of removal of such foci. Miller[12] believed that the removal of foci was included with other therapy, a practice which clouded the issue. He considered it unfortunate that removal of chronic foci of infection should be considered by so many physicians or investigators to be the first and major treatment, since this procedure had resulted in the loss of much valuable time which might have been used more profitably in other directions.

However, the fact that removal of chronic foci of infection is not followed by rapid or notable relief does not invalidate the importance of eradication of such foci. Several workers have insisted that results of removal of foci of infection may be poor because often more than one focus is present. Foci are too often imperfectly removed, and indeed it is impossible to eradicate them if the focus is not local but is diffuse (for example, nasopharyngitis). Last, too much may be expected of removal of foci of infection in the presence of irreversible articular pathologic change.

Buckley[13] at times noted most remarkable improvement, and even cure, to result from removal of foci and expressed the belief that following removal of foci of infection complete recovery has occurred a sufficient number of times to indicate that such foci may be of etiologic importance in arthritis. The changing views of one authority on arthritis were reported by Cecil and Angevine.[14] In 1927 Cecil and Archer[15] reviewed 200 cases of chronic infectious arthritis in which focal infection seemed to play a major role in the causation of the disease. In 1938, however, in an analysis of 200 new cases of rheumatoid arthritis, Cecil and Angevine came to the conclusion that although undoubtedly there are instances of chronic infectious arthritis which result from focal infection as far as typical rheumatoid arthritis is concerned, it would appear that chronic focal infection plays a comparatively unimportant role. In the same year in a quarter-century survey of focal infection, Bierring[16] approved the more conservative attitude which has developed with reference to hasty diagnostic conclusions and radical removal of suspected foci of infection, but he considered that clinical and bacteriologic evidence had afforded definite confirmation of the fundamental conception of focal infection and felt that perchance focal infection may yet become the medical guide of the future.

On the basis of our own experience, we feel that, given a patient who has chronic infectious arthritis and in whom a definite focus is present, the focus should be eradicated as soon as the patient's general condition warrants surgical treatment. The decision as to the optimal time to remove a focus should rest with the clinician rather than with the laryngologist. Although we feel that focal infection should be eliminated as early as possible when chronic infectious arthritis is present, we prefer a period of observation to elapse before surgical intervention is attempted, so that we can be sure that progression of symptoms is under control. We prefer that the patient's condition is such that fever is absent or slight, that anemia is improving and that loss of weight has ceased. With attention to these factors, we rarely encounter a flare-up in symptoms of chronic infectious arthritis after surgical elimination of a focus of infection has been carried out. Although it is admittedly impossible to assess accurately the improvement produced by removal of a focus of infection from a patient who, at the same time, is receiving other forms of therapy, we believe that we can expect real diminution in symptoms of definite clinical importance to result from such removal for 5 per cent of patients whose infected tonsils are the only discoverable focus. The same results can be obtained for approximately 4 per cent of patients whose sinusitis seems to be the source of infection.

We encounter many patients who report diminution in symptoms of chronic infectious arthritis after any type of surgical intervention or even general anesthesia has been carried out, but the improvement persists for from three to seven days and then is gradually lost. Improvement which we feel to be of clinical importance is pronounced and is maintained permanently following surgical eradication of a given focus. For the remainder of the patients the operation is of value only for the effect it may have in improvement of the general health of the patient.

GLOMERULONEPHRITIS

Because many of the toxins which develop in the body as results of human or bacterial metabolism are eliminated through the kidney, it might be expected that if the conception of focal infection had an actual

10. Hench, P. S.: Is Rheumatoid (Atrophic) Arthritis a Disease of Microbic Origin? A Summary of the Arguments For and Against the Infectious Theory, in A Survey of Chronic Rheumatic Diseases, London, Oxford University Press, 1938, pp. 35-62.
11. Irons, E. E.: Chronic Arthritis, a General Disease Requiring Individualized Treatments, Ann. Int. Med. **9**: 1658-1663 (June) 1936.
12. Miller, J. L.: A Critical Review of the Literature on Chronic Rheumatism, Arch. Int. Med. **57**: 213-234 (Jan.) 1936.
13. Buckley, C. W.: Prognosis in Arthritis, Lancet **1**: 1023 (May 2), 1081 (May 9) 1936.
14. Cecil, R. L., and Angevine, D. M.: Clinical and Experimental Observations on Focal Infection, with an Analysis of 200 Cases of Rheumatoid Arthritis, Ann. Int. Med. **12**: 577-584 (Nov.) 1938.
15. Cecil and Archer, quoted by Cecil and Angevine.[14]
16. Bierring, W. L.: Focal Infection: Quarter Century Survey, J. A. M. A. **111**: 1623-1627 (Oct. 29) 1938.

physical counterpart the kidney would be likely to be affected by the supposed toxins produced. No experimental work yet done has provided an explanation for the exact pathogenesis of acute glomerulonephritis as it occurs in man. In the recent work of Schwentker and Comploier,[17] for example, rabbits received emulsions of homologous kidneys alone and in combination with streptococcic toxin. Control animals received toxins alone. In the blood of these rabbits complement fixing antibodies were found which were similar to complement fixing antibodies found in the blood of a majority of patients who had scarlet fever. This work suggests that cytotoxins originate autogenously when the kidney is injured by toxins, but it does not explain why it is that clinically recognizable nephritis develops among some persons while they have scarlet fever, whereas among others it does not.

By "acute glomerulonephritis" is meant acute renal disease in which there is definitely impaired renal function as evidenced by the loss of large amounts of albumin in the urine, retention of nitrogenous products in the blood, bleeding from the parenchyma of the kidneys, severe oliguresis or, in some instances, anuria. It is generally recognized that a patient who has "acute nephritis" may die during an acute attack of the disease, that such a patient's kidneys may become completely healed, or that his condition may eventually develop into chronic glomerulonephritis.

Woods and Binger [18] estimated the etiologic agents in 61 cases of acute glomerulonephritis at the Mayo Clinic. These patients previously had shown no evidence of renal disease. Woods and Binger found that in 84 per cent of the cases the condition had developed during acute inflammation of the upper part of the respiratory tract, including cases in which the diagnosis was acute coryza, acute mastoiditis, acute tonsillitis or acute pharyngitis. Fourteen of the patients in this series had undergone tonsillectomy and 7 had undergone mastoidectomy while the nephritis which they had was in a comparatively active stage. After elimination of the focus of infection a noticeable improvement in the renal disease was noted. It was suggested that elimination of these foci of infection was largely responsible for the favorable and encouraging results in this series of cases, because neither death nor chronic nephritis ensued in any of the 21 cases mentioned in which the acute focus of infection was eliminated.

It is widely accepted that chronic glomerulonephritis is not a progressive disease which starts from one acute attack of nephritis but that it is caused, rather, by repeated or continued toxic assaults on the kidneys which originate in acute or chronic foci of infection. The chronic changes resulting from necrosis of tissues are irreversible and when changes are widespread we are aware that little can be done toward cure of chronic nephritis. Of the patients suffering from chronic nephritis who come to us with intermittent exacerbations of the acute phase, more than 80 per cent have evidences of chronic infections about roots of teeth, in the tonsils or in the sinuses. We feel that the clearing up of such foci as soon as possible not only shortens the convalescent period of the acute episode but, in addition helps to protect the patient from further damage to the kidney.

17. Schwentker, F. F., and Comploier, F. C.: The Production of Kidney Antibodies by Injection of Homologous Kidney Plus Bacterial Toxins, J. Exper. Med. **70**: 223-230 (Sept. 1) 1939.

18. Woods, R. M., and Binger, M. W.: Unpublished data.

CONCLUSIONS

Assay of the probable importance of focal infection from the clinical standpoint alone as it concerns the three clinical entities of heart disease, chronic infectious arthritis and glomerulonephritis reveals that we progress from tepidity toward relative enthusiasm to wholehearted acceptance of the conception of focal infection. From the clinical standpoint we find it impossible to distinguish clearly among the acute focus the subacute focus, the chronic focus with acute exacerbation or the true chronic focus, because the transitions between these several states are not sufficiently abrupt. It seems certain that the conception of focal infection is of definite clinical usefulness and that it is unreasonable to expect removal of foci of infection to eliminate the fibrous end result of tissue necrosis. Viewed from this standpoint, such papers as the one of Cecil and Angevine seem to lose much of their force antagonistic to this conception. In a "revaluation" of the conception of focal infection it would seem the more logical procedure to consider it in relation to a single disease entity rather than to become lost in generalities, and it would seem wise to consider, along with the results secured, the stage of the condition present and the pathologic processes involved.

Results of the study suggest that the type of condition being seen by a given clinician tends to influence his attitude toward the conception of focal infection.

OBSERVATIONS ON THE PROPHYLACTIC USE OF SULFANILAMIDE ON RHEUMATIC PATIENTS

WITH A REPORT OF ONE DEATH

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With the advent of sulfanilamide therapy it was natural that it should be tried in rheumatic faver. Despite the lack of proof that the hemolytic streptococcus is the etiologic factor in the disease, it has been postulated that the beta hemolytic streptococcus acts as a catalytic agent to start off the rheumatic cycle. It was soon shown by Swift, Moen and Hirst [1] and Massell and Jones,[2] independently, that not only is sulfanilamide of no value in active rheumatic fever but that it is definitely harmful. In January 1939 two papers appeared on the prophylactic use of the drug in susceptible rheumatic subjects, in one of which Thomas and France reported encouraging results in an adult group of ambulatory patients and in the other Coburn and Moore [3] were just as encouraging about a group of children in a convalescent home. With this in view, it was decided to try the drug on ambulatory rheumatic children carrying on their normal activities. The first

From the Children's and Adolescents' Cardiac Clinic of Roosevelt Hospital.

1. Swift, H. F.; Moen, S. K., and Hirst, George: Action of Sulfanilamide in Rheumatic Fever, J. A. M. A. **110**: 426 (Feb. 5) 1938.

2. Massell, B. F., and Jones, T. D.: Effect of Sulfanilamide on Rheumatic Fever and Chorea, New England J. Med. **218**: 876 (May 26) 1938.

3. Coburn, A. F., and Moore, L. V.: Prophylactic Use of Sulfanilamide in Streptococcal Respiratory Infections with Special Reference to Rheumatic Fever, J. Clin. Investigation **18**: 147 (Jan.) 1939; Prophylactic Use of Sulfanilamide in Rheumatic Subjects, M. Clin. North America **24**: 663 (May) 1940.

part of the study was not started until the last of January 1940, owing to lack of technical assistance, and was terminated the end of May.

SELECTION OF PATIENTS

The subjects for the first study were all taken from the Children's and the Adolescents' Cardiac Clinics of Roosevelt Hospital. Every child had had a definite rheumatic attack within the past two years, i. e. polyarthritis, carditis or chorea (chorea had to be accompanied by some other rheumatic stigma before it was accepted as being due to rheumatic fever). Because of the unusual toxicity of sulfanilamide in active rheumatic fever, we excluded any child who we thought was active at the time. In the group used, the average age was 11 years and the average weight 83½ pounds (37.8 Kg.), as opposed to the control group in which average age was 9½ years and average weight 72 pounds (32.7 Kg.). The distribution of sexes in the two groups was the same, being about 50 per cent of each. Each group was made up of 14 children with approximately the same cardiac histories and social status. The only difference between the groups was that the controls lived at some distance from the hospital and were unable to come in regularly for check-ups on the blood and urine.

PROCEDURE

In both groups a preliminary test on the urine, blood count, sedimentation rate determination (Westergren), electrocardiogram and roentgenography or fluoroscopy of the chest were done. Following the dosage used by Drs. Coburn and Moore, we gave 1.5 Gm. of sulfanilamide in three divided doses to the children weighing less than 55 pounds (24.9 Kg.) and 2 Gm. to those weighing more than 55 pounds. Each child was given a printed set of instructions directing him to report any sign of toxicity immediately to the social worker or to the doctor in the accident room. Each child was instructed to report to the laboratory twice a week for the first three weeks for a check-up on the hemoglobin and the white blood cell count and to report weekly thereafter. At every visit the urine was tested for bile. Sedimentation rates were done at least once a month. The control group was not followed so closely.

RESULTS OF FIRST STUDY

Of the 14 children taking the drug, 7 did well and no further comment is needed. There were 2 cases of rash on a dosage of 0.6 Gm. three times a day which disappeared when 0.6 Gm. was given only twice a day. The drug was stopped entirely in 5 cases. In 1 of these a drug rash persisted even after the dosage had been reduced. In another, the rash was so severe in three days that it was deemed foolhardy to continue even on a reduced dosage. There is some uncertainty about 1 of these 5 children because he had a febrile incident in the home and stopped the drug himself. In the remaining 2 cases the drug was stopped because of the reduction of the polymorphonuclear cells; in 1 the cells dropped to 26 per cent on the twenty-first day and the other to 30 per cent at the end of eleven weeks. We decided to stop the drug when the polymorphonuclear count dropped to 30 per cent and were always concerned when it got below 45 per cent. At such times we did daily counts. There were 4 cases in which this occurred.

Of the 14 children in the control group, 7 remained well. Three had respiratory infections necessitating bed rest but showed no signs of rheumatic activity. Two children had questionable rheumatic activity and 2 had a definite rheumatic flare-up.

The number the first year was small but we wished to gain some knowledge of the difficulties involved in using the drug on ambulatory children before undertaking a larger group.

PROCEDURE OF SECOND STUDY

In the fall of 1940 we started the study again on a larger scale. We decided to use any child or adolescent who had a definite diagnosis of a previous rheumatic episode regardless of when it occurred, as long as the condition was inactive at the time that the drug was started. We feel that any child who has had an attack of rheumatic fever is subject to a recurrence until well past adolescence, at which time the danger is less apparent. To be of any real value, a prophylactic measure of this kind would, of necessity, have to be used yearly until the patient reached the age of 17 or 18 years. For this reason all we required for inclusion in this group was a previous diagnosis of rheumatic fever.

The same method of taking white and red blood cell counts twice a week for three weeks, then once a week thereafter, was used. Sedimentation rates were also determined at the beginning and at least once a month thereafter. Since we had run into no difficulty with the urine the previous year, this test was eliminated.

RESULTS OF SECOND STUDY

Thirty-two patients were started on the drug early in December. The results are summarized here and more detailed histories are given at the end of this article.

Eighteen patients were treated without incident. One boy was readmitted to the ward three weeks after he started taking the drug. However, his condition may not represent a reactivation, since it was active by laboratory tests six weeks before admission to the group, though inactive by the same tests two weeks before admission. His probably was a condition of continued activity rather than a fresh flare-up of an inactive case. Three patients did not cooperate in getting regular blood counts. Nausea developed in another, necessitating stopping of the drug. Rash developed in 3 cases and the drug had to be discontinued, as lowering the dosage did not relieve the symptoms. In 5 cases there was a lowering of the blood count to levels which we considered alarming. In 3 of these 5 it was necessary to stop the drug altogether.

The last patient, a boy aged 12 years, was found to have an enlarged heart, electrocardiographic changes and an elevated sedimentation rate in July 1938. He had chorea in December 1938. On Dec. 27, 1940 he was started on sulfanilamide 0.6 Gm. three times a day. He came regularly for his blood counts and was doing well. His blood count on Jan. 22, 1941 showed a red blood cell count of 4.7 million, a white blood cell count of 5,550, polymorphonuclears 50 per cent, eosinophils 2 per cent, band forms 7 per cent, lymphocytes 43 per cent and mononuclears 3 per cent. On January 25 a sore throat and an elevation of temperature developed. He did not come to the hospital, as advised, but stopped the drug and saw his local physician, who treated him symptomatically for one day. The following day he received 0.6 Gm. of sulfanilamide and the next day was admitted to the hospital, having had 0.3 Gm. before he came. When he arrived at the hospital sixty hours after the onset of symptoms he had exudate with a

few ulcers on his throat and a temperature of 105 F. The blood count showed normal red cells and 300 white cells, with only 1 per cent polymorphonuclears. The sulfanilamide level was 1.86 mg. per hundred cubic centimeters. Blood culture showed hemolytic Staphylococcus aureus and three days later hemolytic Staph. aureus and pneumococcus type III, at which time the sulfanilamide level was 1 mg. per hundred cubic centimeters. His course was steadily downhill; the temperature never went below 105 F. At no time did he have more than 1 per cent polymorphonuclears. He died on the fourth day despite transfusions twice a day, pentnucleotide, yellow bone marrow extract and liver extract. For the hemolytic Staph. aureus he received bacteriophage. As a last effort he was given intravenous sodium sulfathiazole three hours before death. The cause of death was acute agranulocytosis with secondary infection of the blood stream with hemolytic Staph. aureus and pneumococcus type III. Unfortunately permission for an autopsy or bone marrow study was not granted.

COMMENT

Since the beginning of the study we had been concerned with the possibility of sulfanilamide toxicity if given over a long period of time, even in small doses. We had hoped to avoid any toxicity by careful observation of the patients and frequent laboratory check-ups of the blood. We selected only children whose parents we felt would cooperate with us in seeing to it that the patients reported regularly. Despite this, we found that the human equation militated against us and that in some cases from one to two weeks would go by before a child would report for blood counts or for clinic appointments. Also, when unforeseen conditions arose the parents would not consult us but would use their own judgment as to how to treat the situation. The most efficient and sympathetic aid was given by the social worker and the laboratory technician.

With these precautions, in the first year one half of the patients had to give up using the drug because of some toxic reaction. In the second year, when the drug had been used but two months, 9 patients out of 32 had to discontinue using it, and 1 death occurred which was attributable to the sulfanilamide. After the death we had many consultations as to whether or not the study should be continued and finally decided to stop the use of the drug prophylactically in our clinic.

We feel that the drug should not be used as a prophylactic for the ambulatory rheumatic patient because in our experience, while subject to rigid precautions, it failed. We do not feel that a simple reduction in the dosage is the answer, although the toxicity of the drug was diminished considerably thereby. We feel that no large group of children can take the drug in any dosage over the necessary eight to ten winters without some mortality from its use.

CONCLUSIONS

1. Sulfanilamide can be a lethal drug when used prophylactically on the rheumatic patient.

2. At the present state of knowledge the drug should not be used in ambulatory rheumatic children and adolescents.

BRIEF SUMMARIES OF CASES IN WHICH SOME DIFFICULTY WAS ENCOUNTERED

In cases 1, 2 and 3 the only difficulty was lack of cooperation in obtaining blood counts regularly.

A boy aged 7 years (case 4) was nauseated two days after taking the drug. He refused to continue even on a reduced dosage. He had no change in the blood count.

Patient 5 had a rash at the end of thirty days on a dosage of 0.6 Gm. three times a day. The drug was stopped for five days with disappearance of the rash. Then she was started on 0.3 Gm. three times a day. She stopped the drug five days later because of headaches.

Patient 6, after one month on 0.6 Gm. twice a day, had swelling of the face and a drop in polymorphonuclears to 35 per cent. The next day the polymorphonuclears were 44 per cent, so the drug was continued. The day after that, he had a chill and the swelling of the face persisted, with polymorphonuclears of 50 per cent. Despite vagueness of symptoms, the drug was stopped and the swelling disappeared.

Patient 7 was taking 0.6 Gm. three times a day. A severe headache developed after the first dose, and after the second dose her teacher said that she was feverish, restless and had no appetite. The next day she took one more dose and in a short while had a recurrence of the severe headache and a punctate rash on the abdomen, so the drug was discontinued.

In case 8 on 0.6 Gm. twice a day, the polymorphonuclear cells dropped to 32 per cent the day after it was started. The drug was stopped for two days and the polymorphonuclears returned to 46 per cent. The drug was then given in doses of 0.3 Gm. three times a day. There was no further difficulty on this dosage.

Patient 9 took 0.6 Gm. three times a day. The polymorphonuclears fell to 28 per cent in five days. The next day, without change in the dosage, the polymorphonuclears rose to 56 per cent, but we reduced her dose to 0.3 Gm. three times a day. Two weeks later the polymorphonuclears were 45 per cent, at which time the study was terminated.

Patient 10 at the end of eight days had a generalized erythematous rash which disappeared twenty-four hours after the drug was stopped. He was then put on 0.3 Gm. twice a day and had no further rash, but two days later the polymorphonuclear cells fell to 37 per cent, and the next day the polymorphonuclear cells dropped to 31 per cent even though the drug had been stopped. Two days later they were still 31 per cent, although the total white cell count had risen from 4,100 to 6,700 cells.

Patient 11 on a dosage of 0.6 Gm. three times a day had polymorphonuclear counts fluctuating between 53 per cent and 38 per cent, necessitating frequent counts. The dosage was cut in half and the count was 37 per cent after six days, at which time the study was ended.

Patient 12 had a fall in polymorphonuclears to 35 per cent in ten days, but without stopping the drug he had a return to normal and continued without incident to the end of the period.

A girl aged 15 (case 13), weighing 115 pounds (52.1 Kg.), had taken the drug the previous year. At that time her polymorphonuclear cells fell abruptly to 30 per cent at the end of three months. This year, on a reduced dosage of 0.3 Gm. twice a day, she broke out after seven days in an urticarial rash on the hands and feet. There were no changes in the blood count. However, the drug was stopped. This case is particularly interesting because it may indicate a change of sensitivity to the drug.

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Clinical Notes, Suggestions and New Instruments

THROMBOSIS OF THE INFERIOR VENA CAVA FOLLOWING PHYSICAL EXERTION

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During the past year we have had the opportunity to observe a case of obstruction of the inferior vena cava from shortly after the onset of the condition to the establishment of an apparently adequate collateral circulation. Because of the rarity of the condition and the unusual etiology, the case seems worth reporting.

REPORT OF CASE

A white girl aged 20, a physical education student, consulted the University of Wisconsin Health Service on Nov. 6, 1940 because of edema of the legs and enlarging abdominal veins. She had been well until July 29, 1940, when while "tumbling" she did a "back flip." At this time she felt "something pull" in the lower part of the back. There was little discomfort, however, until two days later, at which time there was aching in the small of the back, particularly when she was in the recumbent position, which was somewhat relieved by flexion of the thighs. The following day (August 1) the pain was present with walking or with straightening of the back, and the discomfort gradually became so severe that medical attention was necessary. A physician taped the lumbar region, but this seemed to aggravate the condition. On August 3 there was cramplike pain in the thighs, particularly the left, and general malaise associated with a slight febrile reaction. The symptoms became so severe that bed rest was necessary for the next three weeks. During this period the temperature rose to 102 F. The anterior aspect of the thighs became blue and somewhat edematous, the left more so than the right. There were repeated cramps in the legs which were associated with a temporary increase in the discoloration and were partially relieved by massage. When she attempted to stand, both the legs and thighs became swollen and blue, but elevation of the legs relieved this. At the end of three weeks the discomfort and fever had subsided and the patient was allowed out of bed. The legs then became hard and edematous, reaching what was considered to be two or three times their normal size. The edema was greatly relieved after a period of bed rest. On September 30 the patient was allowed to return to school. She then discovered for the first time that the veins of the right side of the abdomen were becoming large.

The past medical history was positive for measles, whooping cough and scarlet fever in early childhood. There had been repeated colds and sore throats. In 1937 an apical systolic murmur had been heard. On July 11, 1940 diseased tonsils had been removed and on July 25 a submucous resection was performed. Normal convalescence followed both surgical procedures.

On physical examination, November 6, the patient was well developed and well nourished and appeared to be in excellent health. There were no gross abnormalities of the eyes, ears, nose or throat. Fundoscopic examination gave negative results. There was a soft systolic murmur heard along the left sternal border and at the apex, present in all positions, but it practically disappeared with deep inspiration. The blood pressure was 124 systolic and 74 diastolic. Inspection revealed obvious enlargement of the superficial veins over the lower part of the chest, abdomen and upper part of the thighs, particularly on the right side. Over the lower half of the abdomen the venous blood flow was from below upward. The liver and spleen were not enlarged and ascites was not present. There was extensive edema of the legs and thighs with a bluish mottling, particularly on the left side, but the patient stated that there was much less edema than there had been a few weeks before.

From November 19 to December 4 the patient was in bed with mumps. During this period the edema was less pronounced and the superficial veins were less evident.

The patient has been observed periodically since. There has been a gradual decrease in the edema of the legs, but the abdominal veins have remained prominent. In February 1941 she was allowed to resume slowly the activities required of a physical education student. By June she was swimming, playing lacrosse and tennis and doing some modern dancing. The legs and ankles returned to their normal size and the edema would become evident only after a day of considerable physical exertion.

COMMENT

The diagnosis in this case was obstruction of the inferior vena cava, partial or complete. Extensive studies were made in December 1940 while the edema was still evident and again in June after the collateral circulation had apparently compensated for the obstruction. Blood studies including hemoglobin content, red and white blood cell counts, differential counts, serologic examination, determination of the blood sugar, nonprotein nitrogen, platelets, bleeding and coagulation time, chlorides, cholesterol, sedimentation rate, serum proteins and

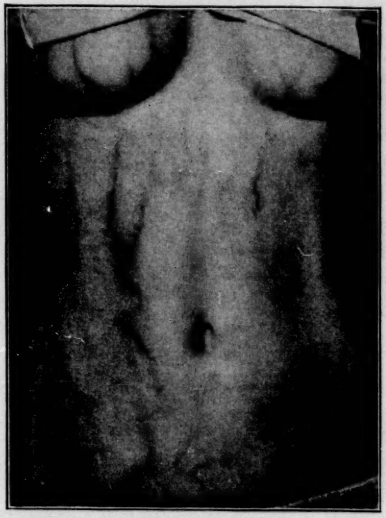

Fig. 1.—Appearance of abdominal veins on Dec. 17, 1940.

the albumin/globulin ratio were within normal limits. Routine examinations of the urine were negative. Further renal studies, including dilution concentration tests, phenolsulfonphthalein and the urea clearance, were within the normal range. In December 1940 the cephalin-cholesterol test was 2 plus, suggesting slight impairment of liver function, although the galactose tolerance test was within normal limits and the plasma prothrombin time was 100 per cent.

Numerous roentgenograms of the spine and abdomen were made. The vertebrae were normal in position and there was no evidence of a tumor. Although careful neurologic studies gave repeatedly negative results, a spinal puncture was done in December. The spinal fluid was normal in every detail. In June 1941 roentgenograms of the abdomen were made to determine whether calcification of the vena cava had occurred, as has been reported in similar cases, but none was found.[1]

Since Castellanos [2] has stressed the importance of visualization of the inferior vena cava for location of tumor masses, in

1. Keen, J. A.: A Case of Complete Obstruction of the Inferior Vena Cava, Brit. M. J. **2**: 823-825 (Dec. 14) 1940.
2. Castellanos, Agustin, and Pereiras, Raul: La cavografía inferior; Communicación preliminar, Arch. de med. int. **4**: 362, 1938.

June 1941 diodrast was injected into the distal portion of the great saphenous vein of the right foot. This showed the right common iliac vein well outlined. The shadow of this vein was traced to the level of the disk between the third and fourth lumbar vertebrae, above which it gradually faded. Some of the communicating veins lateral to the lumbar spine filled with diodrast so that dilated and tortuous collateral veins were visualized overlying the right side of the sacrum. Therefore, though this examination did not demonstrate definitely a complete block in the inferior vena cava, it showed a well developed collateral circulation. Roentgenograms of the chest and of the kidneys, including pyelograms, were all negative.

More detailed studies were made of the cardiovascular system. An orthodiagram in January 1941 showed the great vessels to be normal. The heart was within normal limits as to size and shape except for a slight dilatation of the left auricle posteriorly and to the right. Because of the murmur and the characteristic orthodiagram, it was felt that a mitral lesion existed. It is probable that this lesion had been present previously, since a systolic murmur had been noted in 1937. Orthodiascopy was repeated in June and showed no change. In January 1941 the electrocardiogram showed slight elevation of the ST segments in all four leads which had practically disappeared in May 1941. One month later the ST segments had again become elevated. In February 1941 venous pressures determined by the direct method were 17 cm. of water in the antecubital vein and 21 cm. of water in the ankle vein. In June determinations by the indirect method as described by Eyster[3] were 7 cm. of water in the wrist vein and 21 cm. of water in the ankle vein. Also on this date the circulation time was studied by the use of 10 per cent calcium gluconate. The circulation time from the antecubital vein to the tongue was seven seconds and from the ankle vein to the tongue was ten seconds. The circulation time from the antecubital vein to the lung by the ether method was four seconds.

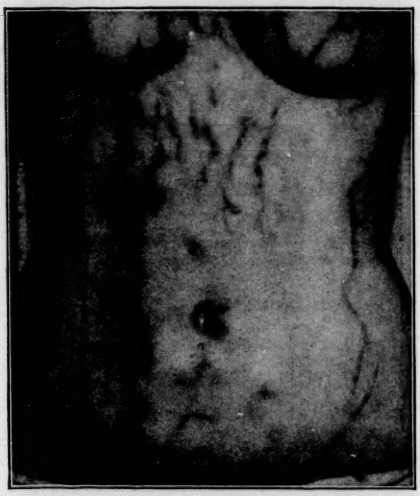

Fig. 2.—Appearance of abdominal veins on June 11, 1941.

COMMENT

In a review of 314 cases of obstruction of the inferior vena cava Pleasants[4] has classified them according to their etiology as follows: obstruction due to (1) thrombosis primarily, (2) new growths within the inferior vena cava, (3) nonmalignant disease of the abdomen, (4) new growths outside the vena cava, (5) kinking of the inferior vena cava, (6) congenital obliteration and (7) ligation. One hundred and seventy-one fell into the first group, and of these 41 were due to specific infectious diseases, 8 were a complication of chlorosis, 45 followed puerperal sepsis, 17 were due to local inflammatory foci, 18 were from direct trauma, 2 resulted from injury associated with overexertion and 40 were of unknown etiology.

We believe that the obstruction in this case was due to thrombophlebitis following overexertion. Several points in the history are of interest and are fairly significant. There was a history of recent surgery to the nose and throat at which time badly diseased tonsils were removed. Ochsner and DeBakey[5] emphasize that "trauma whether operative or nonoperative predisposes to thrombophlebitis either directly as a result of injury to vessels or indirectly as a result of injurious substances derived from destroyed tissue." Also there is a remote possibility that a temporary bacteremia followed tonsillectomy with injury to the vascular system. The history of additional trauma due to overexertion is fairly definite. It was during a "back flip" that our patient felt something give way in her back, and all her symptoms dated from that episode. Though such an etiology is doubtless rare, there are several cases in the literature presenting somewhat comparable histories. Pleasants[4] mentioned 2 cases, 1 in which thrombosis followed a forced march and another in which there was "overexertion followed by severe lumbar pain and symptoms of obstruction." Shattock[6] described the condition in a medical student aged 24 who had severe lumbar pain after running a race. This was followed by edema of the legs and enlargement of the superficial veins. An autopsy on this patient twenty-five years later showed occlusion of the inferior vena cava extending from below the portal vein to the renal veins. In our case it seems reasonable to suppose that the sudden strain from strenuous physical exertion caused an injury to the wall of a vessel which may have been weakened as a result of recent surgery.

The clinical course was typical of a gradually developing caval obstruction. The first complaint was severe lumbar pain, which was later associated with fever, both symptoms probably being due to thrombophlebitis. This was followed by massive edema of the legs and thighs, which slowly disappeared as the collateral circulation developed.

For a detailed description of the collateral circulation in obstruction of the inferior vena cava, the reader is referred to Pleasants' monograph.[4] Our patient was not seen until her acute symptoms had subsided, so all studies on her must be considered from that standpoint. If these could have been made during the acute phase they would have been more significant. However, in view of the edema described, the extensive collateral circulation and some evidence of possible hepatic involvement three months after the onset of the illness, it is probable that the obstruction occurred in the upper third of the vena cava.

Bay, Gordon and Adams[7] have reported electrocardiographic changes with experimental occlusion of the vena cava in dogs. They found deviation of the ST segment which persisted with the obstruction. It is interesting to note that in the case here reported, ST segment deviation constituted the only abnormal electrocardiographic condition.

The prognosis of inferior caval obstruction is good if the underlying pathologic condition is not progressive and the obstruction is slow enough to permit an opportunity for development of an adequate collateral circulation. There are reports in which a patient has survived for as long as forty years. We feel that our patient will be able to teach physical education as she had planned and that she should be perfectly well so long as she keeps her physical activities within reasonable limits.

3. Eyster, J. A. E.: The Clinical Aspects of Venous Pressure, New York, Macmillan Company, 1929.

4. Pleasants, J. H.: Obstruction of the Inferior Vena Cava with a Report of Eighteen Cases, Johns Hopkins Hosp. Rep. **16**: 363, 1911.

5. Ochsner, Alton, and DeBakey, M. E.: Thrombophlebitis and Phlebothrombosis, South. Surgeon **8**: 269 (Aug.) 1939.

6. Shattock, S. G.: Occlusion of the Inferior Vena Cava as a Result of Internal Trauma (Dissecting Varix?): The Case of the Late W. Rivers Pollock, Brit. M. J. **1**: 385 (Feb. 22) 1913.

7. Bay, E. B.; Gordon, Wayne, and Adams, Wright: Electrocardiographic and Blood Pressure Changes in Experimental Pericardial Effusion and Occlusion of Venae Cavae, Am. Heart J. **8**: 525 (April) 1933.

Council on Physical Therapy

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING REPORT. HOWARD A. CARTER, Secretary.

RADIOEAR MASTERPIECE ACCEPTABLE

Manufacturer: E. A. Myers and Sons, 306 Beverly Road, Mount Lebanon, Pittsburgh.

The Radioear Masterpiece, a carbon microphone aid, was examined by the Council and was found to consist of the following parts:

Microphone number M 1665.
Intensifier A 1434.
Battery case.
Miniature crystal receiver R-2576.
Molded earpiece.
Bone conduction oscillator B-1304.

The microphone is disk shaped, 2½ inches in diameter, 5/8 inch thick, weighing approximately 2 ounces, fitted with spring clip for attaching to clothing. The battery case and intensifier are of molded bakelite. The battery case carries two 1.5 volt cells, size C, number 935, for air conduction, or three similar cells for bone conduction. With two cells the weight is approximately 6½ ounces and with three cells approximately 7 ounces. The earpiece is of molded bakelite, to be fitted into the ear cavity. The receiver is of the miniature magnetic type, 5/8 inch in diameter and 9/16 inch thick. Receiver and earpiece together weigh approximately 0.4 ounce. The bone conduction oscillator is rectangular, 1½ by ¾ by 5/8 inch, weighing approximately 0.8 ounce. All parts are mechanically well constructed. The fact that ordinary commercial dry cells can be used and are easily replaceable is a distinctly advantageous feature.

Radioear Masterpiece.

Battery Consumption.—With the two cell battery of 3 volts for air conduction the currents drawn are as follows:

Control barely on	25 milliamperes
Control half on	30 milliamperes
Control fully on	40-50 milliamperes

With the three cells, 4.5 volts for bone conduction,

Control barely on	35-40 milliamperes
Control fully on	70-75 milliamperes

Internal Noise.—Direct comparison of the internal noise with the noise from an audiometer of the buzzer type indicates that the noise level is of the order of 20 to 25 decibels above the normal ear threshold. This would not be a disturbing element in cases of deafness in which the threshold of hearing is below normal by this amount. There is no "feed back" noise in the instrument under conditions of use.

Amplification.—Using two deaf subjects, the amplifications at discrete frequencies from 128 to 4,096 cycles were measured audiometrically. The receiver of a Western Electric 2-B audiometer was set in a capsule of sponge rubber and the threshold of the subject was measured with the receiver thus enclosed held to the ear. The thresholds were again determined with the transmitter of the hearing aid laid on the sponge rubber capsule and the earpiece inserted in the ear of the subject. The differences between the two thresholds were taken as the gain in decibels afforded by the aid. Results obtained by the two observers in repeated tests were fairly consistent. The average gains in decibels shown with the air conduction receiver were as follows:

Frequency	128	256	512	1,024	2,048	4,096
Gain	8	7	16	13	8	none

Articulation Tests.—The instrument was found to give satisfactory results in these tests.

The Council voted to accept the Radioear Masterpiece for inclusion on its list of accepted devices.

Council on Pharmacy and Chemistry

NEW AND NONOFFICIAL REMEDIES

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION.

THEODORE G. KLUMPP, M.D., Secretary.

THIAMINE HYDROCHLORIDE (See New and Nonofficial Remedies, 1941, p. 551).

The following dosage forms have been accepted:

Tablets Thiamine Hydrochloride-Endo, 1 mg.; 3 mg.; 5 mg.
Prepared by Endo Products, Inc., Richmond Hill, N. Y.
Solution Thiamine Hydrochloride-Endo, 1 mg. per cc., 6 mg. per cc., 10 mg. per cc., 15 mg. per cc., and 30 mg. per cc. in 1 cc. Ampuls: Each cubic centimeter of solution contains 10 mg. of benzyl alcohol in sterile distilled water.
Prepared by Endo Products, Inc., Richmond Hill, N. Y.
Solution Thiamine Hydrochloride-Endo, 10 mg. per cc., in 10, 25, and 50 cc. vials; 30 mg. per cc. in 10, 25, and 50 cc. vials; 50 mg. per cc. in 5, 10, and 25 cc. vials: Each cubic centimeter of solution contains 10 mg. of benzyl alcohol in sterile distilled water.
Prepared by Endo Products, Inc., Richmond Hill, N. Y.

NICOTINIC ACID (See New and Nonofficial Remedies, 1941, p. 555).

The following dosage forms have been accepted:

Tablets Nicotinic Acid, 25 mg.
Prepared by the International Vitamin Corp., New York.
Tablets Nicotinic Acid, 50 mg.
Prepared by the International Vitamin Corp., New York.
Tablets Nicotinic Acid, 100 mg.
Prepared by the International Vitamin Corp., New York.

SUSPENSION OF EPINEPHRINE IN OIL, 1: 500-N. N. R. (See New and Nonofficial Remedies, 1941, p. 255).

Epinephrine in Oil, 1: 500-Smith-Dorsey.—A brand of suspension of epinephrine in oil 1: 500-N. N. R.

Manfactured by The Smith-Dorsey Co., Lincoln, Neb. No U. S. patent or trademark.
Ampuls Epinephrine in Oil 1: 500-Smith-Dorsey, 1 cc.: A suspension of 2 mg. powdered epinephrine crystals in 1 cc. of peanut oil.

EPHEDRINE SULFATE (See New and Nonofficial Remedies, 1941, p. 247).

The following dosage forms have been accepted:

Ampoules Ephedrine Sulfate Solution-Endo, 0.05 Gm. (¾ gr.), 1 cc.
Prepared by Endo Products, Inc., Richmond Hill, N. Y. No U. S. patent or trademark.
Tablets Ephedrine Sulfate-Endo, ¾ grain.
Prepared by Endo Products, Inc., Richmond Hill, N. Y. No U. S. patent or trademark.

CYCLOPROPANE (See THE JOURNAL, May 31, 1941, p. 2505, and the Supplement to New and Nonofficial Remedies, 1941, p. 5).

CYCLOPROPANE (OHIO CHEMICAL & MFG. CO.).—A brand of cyclopropane-U. S. P.

Manufactured by Ohio Chemical and Manufacturing Co., Cleveland. No U. S. patent or trademark.

SODIUM MORRHUATE (See New and Nonofficial Remedies, 1941, p. 501).

The following dosage form has been accepted:

Vial Sodium Morrhuate 5% and Benzyl Alcohol 2%, 5 cc.: Each cubic centimeter contains 0.05 Gm. of sodium morrhuate and 0.02 Gm. of benzyl alcohol in aqueous solution.
Prepared by The Lakeside Laboratories, Inc., Milwaukee.

CAFFEINE WITH SODIUM BENZOATE (See New and Nonofficial Remedies, 1941, p. 173).

Flint, Eaton & Co., Decatur, Ill.

Ampuls Solution Caffeine with Sodium Benzoate, 2 cc.: An aqueous solution containing in each 2 cc. of caffeine with sodium benzoate, U. S. P., 0.5 Gm. (7½ grains).

TETANUS TOXOID, ALUM PRECIPITATED (See New and Nonofficial Remedies, 1941, p. 470).

Parke, Davis & Company, Detroit.

Tetanus Toxoid, Alum Precipitated (Refined).—Marketed in packages of two 1 cc. vials (one immunization treatment) and in packages of one 10 cc. vial (five immunization treatments).

THEOPHYLLINE WITH ETHYLENEDIAMINE (See New and Nonofficial Remedies, 1941, p. 583).

The following dosage form has been accepted:

Ampule Solution Aminophylline, 20 cc., 0.48 Gm. (7½ grains).
Prepared by The Lakeside Laboratories, Inc., Milwaukee.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

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SATURDAY, DECEMBER 20, 1941

EMERGENCY MEDICAL SERVICE FOR CIVILIAN DEFENSE

Under the section on Medical Preparedness in this issue of THE JOURNAL appears a special announcement from the Office of Civilian Defense on the relationship of emergency medical service to control centers. Last week the Council on Medical Education and Hospitals of the American Medical Association mailed to all hospitals reprints of two bulletins which have been issued by the Medical Division of the Office of Civilian Defense. These were published in THE JOURNAL under the heading of Medical Preparedness on August 30 and November 22. Those hospitals which have not received the bulletins should communicate at once with the Office of Civilian Defense. The outlines supplied, together with the information which appears in our current issue, give all the information needed for complete cooperation.

The significant steps include the following:

1. State and local authorities who have not done so should at once appoint state and local chiefs of emergency medical service in consultation with state medical societies.

2. State defense councils should instruct local chiefs of emergency medical service to complete a spot map which will show:

(*a*) Localization of all hospitals.

(*b*) The number of emergency medical squads available.

(*c*) Sites for casualty stations in each section of the city.

3. Inventories should be made of bed capacity of hospitals inside and outside of cities, and the amount of expansion possible during an emergency determined.

4. Arrangements for transportation should be organized immediately in each district under control of the local civilian defense commander.

5. Staffs of hospitals and agencies for transportation should have a drill each week to perfect themselves for action in time of emergency.

Medical facilities from which the civilian defense organization in each state is being developed are at the local level. In each community, therefore, the local chief of emergency medical service may set up medical advisory councils. He will, of course, utilize the local health department, experienced hospital administrators, representatives of the local medical society and the nursing organizations, and the American National Red Cross and other voluntary agencies. The full responsibility must rest with the local chief of emergency medical service and with his medical advisory council. All agencies must cooperate with this central organization. Attempts to delegate this responsibility or to divide it can result only in confusion and ultimately in disaster.

The medical profession may be relied on to accept the responsibility in this work, as in all other aspects of medicine, in relationship to the emergency. Obviously selection of physicians for work in the civilian defense agency should be left largely to men above the age of 45, since younger men will be required for the active needs of the military and naval services.

SPECIAL DIETARY FOODS AND THE LAW

Mr. Paul V. McNutt, Administrator of the Federal Security Agency, has recently promulgated regulations [1] governing the labeling of foods intended for special dietary purposes. The scope of these regulations is extraordinarily broad, apparently encompassing all foods and dietary supplements for which special claims are made or implied relating to health and disease. Included are vitamin and mineral preparations, staple foods fortified or supplemented with vitamins and other dietary elements, foods employed for infant feeding and foods offered as supplements in the management of obesity, malnutrition, food allergies, convalescence, pregnancy, anemias, lactation and disease. However, preparations administered in potent form solely as drugs for the treatment of disease are not subject to these regulations. For instance, addition of thiamine hydrochloride to a cereal will bring the cereal within the scope of the regulations, whereas a capsule containing 10 mg. of the same substance intended for use on a physician's prescription for the treatment of beriberi will presumably be considered a drug and not a food for "special dietary use."

Basically, the purpose of these regulations is to make available to the purchaser the fullest information concerning the vitamin, mineral and other special dietary properties of the article offered. Some method had to be found for expressing vitamin content, as well as the presence of other ingredients, in terms which would be readily understood by the ordinary purchaser. The

1. Food, Drug and Cosmetic Act, Regulations under Section 403 (J), Federal Register, Nov. 22, 1941.

Food and Drug Administration chose the minimum daily requirement as the basis for labeling. Foods to which these regulations apply are therefore required to state on the label the proportion of the minimum daily requirements furnished by a given amount. During the hearings on these regulations, discussion developed as to whether or not the optimum daily requirement should serve as the basis for the statements on the label instead of the minimum daily requirement. As the hearings progressed the impossibility of obtaining a convergence of expert opinion on what constituted an optimum daily requirement became apparent, whereas reasonable agreement was revealed among prominent students of nutrition on the range of values that could be related to the minimum daily requirements of the minerals and most of the vitamins. Unfortunately, the evidence adduced at the hearing was inadequate to permit the administrator to set a figure for nicotinic acid and some of the more recently isolated vitamins.

The public should know the nutritional properties of the food it purchases. When these regulations become effective, this information will be provided for the first time in terms than can be understood. The statement on a label that an article contains 1 mg. of riboflavin means little to the average purchaser; but when the label states, as it will under the new regulations, that a specified quantity of cereal X contains one half the minimum adult daily requirement of riboflavin the purchaser knows at least that additional riboflavin is needed. The Food and Drug Administration is to be commended for a job well done.

THE KENNY METHOD OF TREATMENT IN THE ACUTE PERIPHERAL MANIFESTATIONS OF INFANTILE PARALYSIS

At the scientific meeting of the National Foundation for Infantile Paralysis held in New York early in December, consideration was given to reports on the Kenny method of prevention and treatment of the affected muscles. After the Committee on Research for the Prevention and Treatment of After-Effects had heard the reports from various experimental laboratories and clinics on their investigation of the subject, the committee adopted the following statement:

The National Foundation for Infantile Paralysis has supported studies of the Kenny technic under the auspices of the Medical School of the University of Minnesota and specifically under the direction of the Department of Orthopedic Surgery. The Minneapolis General Hospital was chosen for these studies, as beds were available and the necessary supervision was possible by members of the orthopedic staff and the Physical Therapy Department of the University of Minnesota.

The University Hospital rearranged one section of its building for the work, and the necessary equipment was installed. Since June 1941 work on the Kenny treatment of infantile paralysis during the early stage has been going on at both the University Hospital and the Minneapolis General Hospital under the personal supervision of Miss Kenny and her assistants trained in Australia. Most of the physical therapists of the Twin Cities and many from elsewhere have been working with Miss Kenny and acquiring a knowledge of her methods. The course for physical therapy technicians which has been started at the University of Minnesota includes training in the Kenny method.

The director of the Physical Therapy Department at the University Hospital and the Minneapolis General Hospital, aided by funds of the National Foundation for Infantile Paralysis, is making a detailed study of the method so that he and others may be able to continue with the teaching after Miss Kenny and her staff return to Australia.

It should be emphasized that patients under this treatment have been limited, with few exceptions, to those in the early or acute stage of the disease.

Since June of 1941 about 50 patients in the early stage of infantile paralysis have been treated in the Minneapolis General and the University Hospitals by Miss Kenny and her associates. The care of an almost equal number of patients in other hospitals has been supervised by her, but the actual treatment was carried out by the physical therapists in those institutions.

It is the opinion of this Committee on Research for the Prevention and Treatment of After-Effects of the National Foundation for Infantile Paralysis, after a study of the report of the workers at the University of Minnesota, that during the early stage of infantile paralysis the length of time during which pain, tenderness and spasm are present is greatly reduced and contractures caused by muscle shortening during this period are prevented by the Kenny method. The general physical condition of the patients receiving this treatment seems to be better than that of patients treated by some of the other methods during a comparable period.

It appeared to the Committee on Education and to the Committee on Epidemics and Public Health that the recognition of this method had many implications, particularly since it seemed likely that an outbreak of any considerable size during the spring and summer of 1942 would create a large demand for nurses and physical therapy technicians capable of administering the treatment. These committees therefore adopted the following report:

"It is the opinion of this Committee on Research for the Prevention and Treatment of After-Effects of the National Foundation for Infantile Paralysis, after a study of the report of the workers at the University of Minnesota, that during the early stage of infantile paralysis the length of time during which pain, tenderness and spasm are present is greatly reduced and contractures caused by muscle shortening during this period are prevented by the Kenny method. The general physical condition of the patients receiving this treatment seems to be better than that of patients treated by some of the other methods during a comparable period."

The Committee on Epidemics and Public Health and the Committee on Education of the National Foundation for Infantile Paralysis are aware of the implications of this statement as it relates to the application of the Kenny method in the early stage of infantile paralysis.

Health officers and physicians, including especially pediatricians, now have the intensified responsibility of early recognition of cases of infantile paralysis and the prompt application of appropriate nursing technics and physical methods to these patients.

During the past year the Kenny method has been observed with the aid of the National Foundation in several well recognized medical institutions. For best results this method involves care and the use of special skills under qualified medical supervision.

The Committee on Epidemics and Public Health and the Committee on Education recommend to the National Foundation for Infantile Paralysis that public health officials throughout

the nation be given as promptly as possible information which may be available regarding the nature of the Kenny technic and its integration with other measures of treatment, and the personnel available for its application in outbreaks of infantile paralysis.

The committees recommend furthermore that the training program of the National Foundation for Infantile Paralysis be expanded to provide additional training for considerable numbers of nurses and physical therapy technicians, and recommend expansion of the training program so as to make available additional personnel fully trained in the essentials and principles of the Kenny method.

The committees recommend furthermore that the Committee on Medical Publications of the National Foundation for Infantile Paralysis consider immediately the development of a concise manual providing the essential principles and details of the Kenny method and of other applications of hydrotherapy and physical treatment in the early stage of infantile paralysis.

The committees recommend that state health departments, health officials in larger communities, and other official agencies concerned with the care of infantile paralysis also develop a program to train personnel in the application of the Kenny technic in conjunction with other early treatment of infantile paralysis.

No doubt the National Foundation for Infantile Paralysis will make available in the near future the condensed manual of the technic referred to in these statements and also other information relative to the method so that it may be applied under the direction of competent physicians and specialists in orthopedic surgery as indicated in the individual case. It would, of course, be unfortunate if there should be any attempt to treat patients with infantile paralysis routinely without recognition of the fact that both the severity of the infection and the extent of the paralysis differ in each instance of the disease. Meanwhile the American people and the medical profession are fortunate in having an organization like that of the National Foundation for Infantile Paralysis capable of supporting controlled studies on every aspect of this serious disease and willing, through its board of trustees, to recognize the importance of consulting authoritative scientific information not only in the selection of projects for research but also in extending the results of such research to the patients who need them most. THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION has already pointed out that adoption of the Kenny technic represents an elaboration of well recognized principles in the treatment of acute paralysis and also the basis in scientific research on the physiology of the nervous system which explains the value of the technic as practiced. If there is any revolutionary element in the Kenny technic, it consists in its abandonment of early rigid splinting and the adoption of continuous and meticulous hydrotherapy and physical therapy to maintain the function of muscles which still have nerve supply at the highest possible point, at the same time producing increased comfort for the patient. No doubt the period which will elapse before the coming of infantile paralysis next year will give opportunity to those persons in the medical profession most concerned to prepare themselves to meet the situation with all the new knowledge that the research supported by the National Foundation for Infantile Paralysis has yielded.

SANITATION OF SCHOOL LUNCHES

Increasing interest in hot lunches for school children has been stimulated by a gradual growth of interest in nutrition among children during the past two or three decades. More recently surplus commodities are being diverted to use in schools, and WPA lunch projects have been organized in several communities. The nation-wide concentration on nutrition as a part of the defense effort will inevitably bring even more activity in the schools with relation to lunches.

The school lunch is especially valuable to children who live too far from school to go home for lunch or who for other reasons are compelled to carry lunches to school, and also for all others whose diet at home leaves something to be desired. At the same time the school lunch carries with it definite sanitary hazards which need to be considered and circumvented if the school lunch is to be beneficial and without danger to the health of the children.

Recognizing these facts, the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association at its last meeting authorized the preparation of a statement [1] covering sanitary requirements for school lunches. This statement is now available in mimeographed form. Single copies are provided gratis when requested on school or health department stationery. Quantities can be supplied at nominal prices, which will be quoted. Requests should be addressed to the Bureau of Health Education, American Medical Association, Chicago.

The report outlines briefly the requirements for cleanliness of the lunchroom, kitchen, utensils and dress of attendants and emphasizes personal cleanliness for attendants. There is an outline of necessary equipment for preparing food, for storing it if necessary and for proper dish washing. Pasteurized milk, or boiled milk if pasteurized milk is not available, is specified. Keeping of left-overs for use the next day is condemned and the use of day-old products, unless they contain no ingredient susceptible of spoilage or fermentation, is also interdicted. Special warnings are given with relation to products containing "cream fillings, meringues or nonacid dressings or sauces, such as mayonnaise, whipped cream and French dressings." Emphasis is placed on daily supervision by a responsible person trained for such work. Health examinations and appropriate training of personnel are specified as essentials.

1. Sanitary Requirements for School Lunches.—A statement of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association.

HISTAMINE AND THE TOXEMIA OF PREGNANCY

Since the presentation in these columns [1] of a discussion of the presence of histidine in urine during pregnancy and its significance as a diagnostic sign, further information has accumulated. Careful study by a number of investigators has given somewhat conflicting results. The Tschopps,[2] who examined 600 specimens of urine from 300 patients, reported that histidinuria was found in both males and females, in health and in disease. These data have been essentially confirmed by Racker,[3] who however demonstrated a considerably larger quantity of histidine in the urine of pregnancy than in normal urine. Langley [4] concluded that, while the estimation of histidine in the urine cannot be recommended as a reliable test for pregnancy, it may be a valuable aid in the rapid diagnosis of, or routine testing for, pregnancy. Again, Racker [5] has recently demonstrated that the amounts of histidine which can be isolated from such urine agree with the colorimetric estimations. While excretion of histidine is usually augmented in pregnancy, this result cannot be relied on as the sole diagnostic of this condition.

Kapeller-Adler has now reported further interesting implications of histidine metabolism in pregnancy and presents suggestive relationships of a metabolic product derived from histidine, namely histamine, to the toxemia of pregnancy. This pharmacologically potent base is known to arise normally from histidine in the large intestine; whether the histamine normally present in the various organs of the body has this origin or is actually formed in the various tissues is debatable. Werle and Krautzun [6] have reported that animal tissues, notably kidney, do have the ability to decarboxylate histidine to histamine. In her more recent report, Kapeller-Adler [7] has observed that, in patients with serious symptoms of preeclamptic toxemia, histidine was entirely absent from the urine or was present only in traces. The results have been so consistent that the author proposes the lack of excretion of histidine as a salient feature of profound toxemia. Moreover, improvement was always accompanied by an increase in excretion of histidine, which may be considered a favorable sign in the clinical condition.

In view of the evidence, Kapeller-Adler has investigated the possible nature of this derangement. Instead of being excreted, histidine is possibly being transformed into some other compound, probably one of pharmacologic activity. From a consideration of the chemical structure of histidine, its conversion to histamine seemed likely. Histamine has been isolated [8] from the urine in each of 6 cases of toxemia of pregnancy. A detectable amount of histamine could not be obtained, however, from 39 liters of normal pregnancy urine. These observations strongly suggest that the histamine isolated from urine in cases of toxemia of pregnancy was derived from histidine, which is normally excreted in the urine in considerable quantity throughout pregnancy.

Although many pharmacologic actions brought about by histamine [9] indicate a basis for explaining the pathogenesis and course of toxemia of pregnancy, the mechanism whereby histidine is changed to histamine in eclampsia is not at present clear. The current evidence in connection with histamine and its relation to eclampsia is suggestive and warrants further carefully controlled study.

1. Urinary Histidine in the Diagnosis of Pregnancy, editorial, J. A. M. A. **106:** 2240 (June 27) 1936.
2. Tschopp, W., and Tschopp, H.: Biochem. Ztschr. **298:** 206, 1938.
3. Racker, E.: Biochem. J. **34:** 89 (Jan) 1940.
4. Langley, W. D.: J. Biol. Chem. **132:** 255 (Jan.) 1941.
5. Racker, E.: Biochem. J. **35:** 667 (June) 1941.
6. Werle, E., and Krautzun, K.: Biochem. Ztschr. **296:** 315, 1938.
7. Kapeller-Adler, Regina: J. Obst. & Gynec. Brit. Emp. **48:** 141 (April) 1941.
8. Kapeller-Adler, Regina: Biochem. J. **35:** 213 (Jan.) 1941; J. Obst. & Gynec. Brit. Emp. **48:** 155 (April) 1941.
9. Goodman, Louis, and Gilman, Alfred: Pharmacological Basis of Therapeutics, New York, Macmillan Company, 1941, p. 566.

Current Comment

BLOOD DONATIONS FOR THE ARMED FORCES

Elsewhere in this issue [1] appears a report by Taylor discussing the need for and technical aspects of obtaining large quantities of blood plasma for the United States Army and Navy by the American Red Cross. It is apparent that a great expansion in facilities for collection of plasma is necessary if the required quantities are to be made promptly available. It is also noteworthy that the work already done by the Red Cross confirms previous reports that the withdrawal of 500 cc. of blood has no harmful effect on the health of properly selected donors. In view of the care with which the Red Cross has approached the problem, there should be no difficulty encountered in obtaining volunteer blood donors in sufficient numbers to satisfy all legitimate needs.

DOMESTIC WOVEN CATHETERS

Prior to 1939, woven catheters were made only in France, Italy and Germany. Now domestic products, made by American manufacturers, which are said to surpass foreign catheters in strength, durability and resistance to heat and chemicals are available. A catheter is a woven tubing, with the fabric base coated and polished to the desired size. Silk has been used as the base and natural resins and linseed oil for the coating. New machinery has been devised to speed up production, and nylon has been substituted for silk as the fabric base. American manufacturers have eliminated 70 per cent of the hand labor. Although there is apparently no price difference between domestic and foreign makes, the development of this substitute for foreign imports is particularly timely.

1. Taylor, E. S.: Blood Procurement for the Army and Navy, this issue, p. 2123.

MEDICAL PREPAREDNESS

In this section of The Journal each week will appear official notices by the Committee on Medical Preparedness of the American Medical Association, announcements by the Surgeon Generals of the Army, Navy and Public Health Service, and other governmental agencies dealing with medical preparedness, and such other information and announcements as will be useful to the medical profession.

EMERGENCY MEDICAL SERVICE FOR CIVILIAN DEFENSE

All emergency medical field units, whether organized primarily within or outside of hospitals, should be related to hospitals wherever possible. Their constituent subdivisions, the emergency medical squads, should alternate on periods of duty so as to be available to respond promptly day or night to the call of the district control center. During "waiting" periods, hospital or field drills should be held weekly.

The movement of medical field units will be controlled from the district control center, which will receive air raid warnings from the military establishments in the area. On the sounding of the alert, they will prepare for action but will not move until ordered by the district commander. A main control center will coordinate the activities of all district control centers of a large city or area. Smaller cities operate through a district control center; larger cities are subdivided into a number of districts, each under a district commander in control of the movement and activities of all civilian defense forces within his district. If the medical facilities of the district should prove inadequate to handle the load of the casualty stations and first aid posts or if the hospitals in or assigned to the districts are filled to capacity, assistance can be obtained by appeal to the main control center.

To coordinate these medical activities, the chief of emergency medical service is to be represented on the staff of the main and district control centers. Each control center will require the services of three medical adjutants, so that one will always be on duty. For these assignments the local chief of emergency medical service should provide and instruct an adequate number of medical adjutants.

The medical adjutant in the District Control Center will keep informed of:

1. The location and number of emergency medical squads available in or assigned to the district.
2. The location of sites in the district designated by the chief of emergency medical service as casualty stations.
3. The location and number of hospital beds in or assigned to the district which are available to receive casualties.
4. The location and number of ambulances and other vehicles assigned to the emergency medical service of the district under a transport officer.
5. The maximum number of casualties which the staff of each hospital in or assigned to his district is capable of handling daily. During an incident he should be constantly advised of the number of casualties admitted to each hospital so as to be able to divert casualties to the less crowded institutions and avoid overloading.

The medical adjutant in the main control center will keep informed through the district control centers of the daily census of hospital beds available in all districts of the area and of the status of all emergency medical field units and of all ambulances and other vehicles available in the various districts. He must decide which unit or which hospital in another district will be called into service when the facilities of a given district are overloaded.

Constant vigilance in the exercise of these responsibilities is necessary if the Emergency Medical Service is to function rapidly and effectively in times of need.

GEORGE BAEHR, M.D., Chief Medical Officer.

A PANORAMIC SKETCH OF U. S. ARMY MEDICAL SERVICE TODAY

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The Army Medical Department is made up of a number of component corps, including the Medical Corps, Dental Corps, Veterinary Corps, Medical Administrative Corps, Sanitary Corps, Nurse Corps and a number of enlisted personnel, all under the direction of a Major General who is the Surgeon General of the Army. Medical Department soldiers comprise about 7.5 per cent of the total enlisted strength of the Army.

The Surgeon General is selected by the President from among the senior colonels of the Medical Corps and is appointed for a term of four years. The Medical Corps component of the Medical Department is composed exclusively of doctors of medicine who are commissioned in the various grades from First Lieutenant to Colonel, inclusive.

Assistants to the Surgeon General include three brigadier generals who are chosen from the senior officers of the Medical Corps, and one brigadier general who is chosen from the senior officers of the Dental Corps. During the present military expansion half a dozen senior colonels of the Medical Corps have been made temporary brigadier generals.

MEDICAL SERVICE OBJECTIVES

The Medical Department exists primarily for the constructive purpose of conserving military man power and thus preserving the strength of the armed forces. In general, this is accomplished (1) by the selection, through properly conducted physical examinations, of only those men physically fit for military service; (2) by keeping such personnel in good physical condition, through the application of modern principles of preventive medicine; (3) by furnishing those who do become disabled with such aid, in the form of evacuation and hospitalization facilities, as will speedily restore them to health and fighting efficiency.

Like other branches of the Regular Army in peacetime, the Medical Department devotes as much time as is practicable to the training of its personnel for field duties. But because of the major mission of caring for the sick and injured, only a small proportion of medical personnel can be engaged in field training activities at any one time.

From the Professional Service Division, Office of the Surgeon General, War Department.

Read in the Scientific Sessions of the Second Triennial Medical Alumni Reunion, University of Michigan Medical School, Ann Arbor, Mich., Oct. 3, 1941.

During war or serious threat of hostilities, the Regular Army, supplemented by the National Guard and Officers' Reserve Corps, forms a nucleus for the development of a potentially powerful defense force. As Medical Department expansion is obliged to keep pace with the general growth of the military establishment, officers of the Regular Army Medical Corps, for the most part, must forsake their normal professional activities to take over Medical Department executive and administrative duties. The actual care of the sick and injured then falls chiefly on Reserve Officers who are called to active duty. Even so, there is much medicomilitary work of an administrative nature to be done by newly activated Reserve Officers. Therefore it is sometimes impracticable to assign Medical Reserve Officers to purely professional duties within their chosen fields of specialization. Every reasonable effort is made, however, to place individuals in positions where their training and ability may be used to best advantage.

PERSONNEL

The United States Army, which on July 1, 1939 consisted of approximately 13,000 officers, 675 nurses and 174,000 enlisted men, today has expanded nearly tenfold to include approximately 90,000 officers, 6,000 nurses and 1,480,000 enlisted men. Of this number about 14,000 are Medical Department officers and 109,000 are Medical Department soldiers. At present there are more officers on active duty in the Medical Department alone than were in all branches of the Regular Army combined in 1939. These officers include approximately 10,000 physicians in the Medical Corps, 2,300 dentists in the Dental Corps, 600 veterinarians in the Veterinary Corps, 1,000 nonprofessional officers in the Medical Administrative Corps and 200 technical officers in the Sanitary Corps.

Enlisted Medical Department recruits are sent, if practicable, to one of three Medical Department replacement training centers. These centers are located at Camp Grant near Rockford, Ill., at Camp Lee, near Petersburg, Va., and at Camp Barkeley, near Abilene, Texas. The replacement centers give new recruits thirteen weeks of intensive basic military training before they are permanently assigned to tactical units or stations.

In order that one may visualize how and where the commissioned and enlisted personnel of the Medical Department are utilized, I will describe briefly the more important installations.

THE SURGEON GENERAL'S OFFICE

The Office of the Surgeon General, War Department, in Washington, D. C., is the nerve center of the Army Medical Department. This office is under the direction of Major General James C. Magee, the Surgeon General of the Army, and at present includes a staff of approximately 100 officers, 4 nurses and 740 civilian employees.

The office is organized into twelve divisions to facilitate the performance of its diverse functions. It is in this office that Medical Department policies are formulated and administrative supervision of professional services to the sick and injured personnel of our Army is maintained. One division of this office manages all of the fiscal and supply business of the Medical Department, while another division is charged with the selection, classification and disposition of commissioned and enlisted medical personnel. The office, through its Preventive Medicine Division, exercises advisory supervision over military sanitation and control of communicable diseases in the Army.

The Surgeon General's Office coordinates the development of adequate facilities for the hospitalization of all sick and injured military personnel. Actual construction of hospitals, however, is a responsibility of the Quartermaster Corps. Vital statistics pertaining to the military establishment, monthly reviews of the health of the Army, and annual reports of the Surgeon General are prepared here.

The office administers the Army Medical Library, the largest medical library in the world. Dental, veterinary and nursing divisions of the office are charged with the administrative, professional and advisory supervision over the activities of their respective corps. Another division is concerned with Medical Department planning and training activities.

Let us now consider some other Army medical establishments. The more important ones are the military hospitals, dispensaries, medical supply depots, medical service schools and field medical installations. Some of these establishments, such as the Medical Department service schools, general hospitals and supply depots, are under direct control of the Surgeon General. Others are under the decentralized control of one of the nine corps area commanders, each of whom has a corps area surgeon and medical assistants on his staff of technical advisers.

MILITARY HOSPITALS

Army hospitals fall into two main classes: (1) fixed and (2) mobile. The latter are intended primarily for use with the field forces in the combat zone of a theater of military operations. Army hospital bed capacity is planned so as to provide fixed hospitalization for 5 per cent of the total military population. Facilities are designed so that expansion can easily be accomplished to care for an additional 1 per cent. This may seem a high percentage, but actually it is not excessive when one realizes that sick soldiers cannot remain in barracks. Individuals with minor illnesses who would ordinarily be treated at home in civil life must, in the Army, be hospitalized. At present the fixed Army hospitals, including those under construction, provide facilities for the care of approximately 96,000 patients.

Fixed (immobile) hospitals include general and station hospitals. The Army general hospitals are capable of caring for 1 per cent of the total military population, while station hospitals are equipped to care for 4 or 5 per cent of all military personnel. Thus hospitalization is immediately available for 5 per cent of the entire Army and, when necessary, the facilities can be rapidly expanded to care for 6 per cent of the military population.

Prior to the current military expansion, the Army maintained only five general hospitals and about one hundred station hospitals within the continental limits of the United States. Now there are fourteen general hospitals with a total capacity of more than sixteen thousand beds. In addition to the facilities available in Army general hospitals, there are at present, completed or under construction, accommodations for approximately 80,000 patients dispersed in about two hundred and twenty-eight Army station hospitals. These establishments vary in size from twenty-five beds to more than two thousand beds each. Plans for further construction of station hospitals have been recommended which will bring the grand total of station and general hospital beds up to more than one hundred and twenty-five thousand. This should be sufficient for an army of 2,500,000 men.

Our vast military housing program has included erection of the aforesaid hospital facilities. Unlike the older permanent Army hospitals, practically all of the new buildings are of the cantonment type, as construction of permanent buildings was not authorized.

It may be recalled that, during the first World War, the American Red Cross assisted the Army by organizing the staffs of fifty base hospitals at certain civilian medical institutions in this country. In 1918 it was my privilege to serve overseas with an evacuation hospital on the western front in France, and later with our Army of Occupation in Germany. Although the mobile hospital to which I was assigned was not a "sponsored" unit, much praise was bestowed on those splendid hospitals that arrived in France with their staffs fully organized and ready to function.

Recognizing the value of the sponsored base hospitals of 1917-1918, the War Department has authorized the creation of similar affiliated units in many of the teaching institutions and larger hospitals in the United States. Today our so-called sponsored or affiliated units include sixty-eight general hospitals, thirty evacuation hospitals and twenty-five surgical hospitals. These units form no part of the Selective Service training program and are not yet an active part of the military establishment. They are designed to function in theaters of military operations and will be called into active service only in the event of a general mobilization.

The University of Michigan sponsored unit is General Hospital No. 298, with an organized hospital staff that can be quickly augmented and ready to serve, if need be, in any theater occupied by our field forces.

MILITARY DISPENSARIES

Although Army hospitals provide both inpatient and outpatient service, we also have outpatient establishments which are not attached to hospitals. These independent units, which are known as "dispensaries," are equipped to render outpatient service to

military personnel not requiring hospital care. Like Army hospitals, they are classified as "fixed" and "mobile."

The Medical Department maintains fixed general dispensaries in some of our large cities, where the size of the military population warrants their establishment, to provide outpatient medical service for military personnel stationed in those cities. There are also fixed station dispensaries (formerly known as infirmaries) at many Army stations to provide outpatient service. These station dispensaries are usually not established at small or compact military posts where station hospitals are provided. They are maintained only at small posts where no hospitals are in operation or at very large posts where, although there are station hospitals, separate outpatient services are desirable. Decentralized dental clinics each equipped with fifteen or twenty-five dental chairs and operating under the remote control of the hospital commander, are also maintained at large stations, especially where troops are scattered in widely separated areas over a large reservation.

Mobile, or unit, dispensaries are provided to serve the nonhospital medical needs of troops in the field. In the combat zone during war or during field maneuvers these mobile or unit dispensaries are called aid stations.

MEDICAL SUPPLIES

The Army Medical Department is charged, among other responsibilities, with the procurement, storage and distribution of all medical supplies used by the Army. This entails an organization of specially trained medical officer personnel, who receive practical instruction in the Army medical supply depots, which are strategically located throughout the country. Medical officers who specialize in supply work are also trained in the Finance and Supply Division of the Surgeon General's Office and are given a course of instruction at the Army Industrial College.

Medical supplies fall into two broad classes; namely, (1) those items which are employed in the routine care of the sick and injured and (2) those items used by tactical units and known as field equipment. The first broad class of medical supplies includes matériel commonly utilized in civilian medical practice. Ordinarily these items may be obtained commercially without difficulty, and their rate of consumption varies more or less uniformly with the size of the Army. Field equipment, on the contrary, is largely noncommercial, more difficult to obtain, and the rate of consumption of its different items varies from a negligible amount in time of peace to the enormous quantities which may be expended during "all out" major hostilities. Field medical equipment includes principally those items and assemblies which are peculiarly adapted for emergency medical service and evacuation of battle casualties in a theater of military operations, particularly in the combat zone.

The Medical Department at present maintains seven active supply depots in the continental United States. These depots are located at New York, Chicago, St. Louis, San Francisco, Savannah, San Antonio and Seattle. Three reserve medical supply depots are also organized and held in readiness but are inactive. Four depots are maintained outside the continental United States in Panama, Puerto Rico, Hawaii and the Philippines. More than 4,000,000 square feet of storage space is utilized in properly assembling, storing and distributing the medical supplies for our present Army of approximately 1,570,000 officers and men.

MEDICAL DEPARTMENT SERVICE SCHOOLS

Facilities for special instruction and training are available at a number of Medical Department establishments. One of the heaviest training loads falls on the Army Medical Center in Washington, D. C., which includes the Walter Reed General Hospital, Army Medical School, Dental School, Veterinary School, Army School for Dietitians and a school for physical therapy aides.

The Army Medical School normally conducts a four months course in postgraduate work for Regular Army medical officers. This course, lasting from September through December, places emphasis on practical laboratory work, preventive medicine and professional medical problems peculiar to military service. Special one month intensive courses in tropical medicine are now being held at the Army Medical School. This instruction trains about thirty medical officers each month in the essentials of tropical medicine. The school also gives special courses for enlisted laboratory and x-ray technicians, engages in medical research concerning problems relating to the military service, and manufactures certain biologic preparations, including all the typhoid vaccine used by the Army, Navy, Public Health Service and Civilian Conservation Corps. The Veterans' Administration, Indian Service and many other agencies are likewise supplied with vaccine from this laboratory, which manufactured 33,500,000 cc. of typhoid vaccine last year.

The Medical Department also maintains a Medical Field Service School at Carlisle Barracks, Pa. This institution is equipped to teach medical military tactics and administration, which otherwise might be learned, perhaps painfully, only in the school of experience.

According to Army Regulations, the objects of the Medical Field Service School are:

1. To instruct and train Medical Department officers in the principles and methods of medical field service so as to increase their ability as instructors and to enhance their proficiency in the performance of their command and staff duties.

2. To instruct and train selected enlisted men of the Medical Department in the duties of noncommissioned officers pertaining to the organization, mobilization, training and operation of Medical Department units.

3. To act as an agency of the Surgeon General in the development and perfection of the principles and methods of field medical service.

4. To assist in the development of field sanitary equipment; to aid in the preparation and revision of Medical Department Training Regulations, instruction manuals and other publications; to make research in matters pertaining to the field duties of the Medical Department, and to disseminate to the military service information concerning the instruction and training used and developed at the Medical Field Service School.

The various courses of instruction at Carlisle parallel or dovetail one another so that the entire year is devoted to intensive teaching and training programs in which emphasis is placed on exemplary and applicatory methods of instruction. One of the important courses normally scheduled was a five months basic course for junior or newly commissioned officers of the Regular Army Medical Department. This basic course has been temporarily discontinued during the present emergency. The six weeks National Guard and Reserve Officers' course and the advanced course for Colonels, Lieutenant Colonels and Senior Majors of the Medical Department have also been discontinued for the present.

In addition to these regular courses at the Medical Field Service School, unit training camps and basic training camps were held throughout the summers prior to the present emergency to afford successive increments of Reserve Officers two weeks of field training.

Two eight week courses are now conducted annually, one beginning in September and the other in April, for the purpose of giving advanced instruction to selected noncommissioned officers of the Medical Department.

Each summer an R. O. T. C. camp is held at Carlisle, lasting six weeks. The practical field training afforded at these camps supplements the didactic instruction given during the academic year by officers at the medical school maintaining R. O. T. C. units. Similar medical R. O. T. C. camps are held each summer at several other military stations.

Because of the national emergency, the normal schedule of courses at the Medical Field Service School has been modified to meet the requirements for speed and mass production. Accordingly, short courses lasting a month were established in 1940. These are known as "refresher courses," and recently they have been lengthened to two months. These short courses, repeated every two months for new increments of officers, review the fundamentals of field medical service and furnish information concerning recent changes and advances in administration, organization, tactics and field equipment. Refresher courses are provided for Medical Department officers of all components of the Army, including Regular Army, National Guard and Reserve Corps. About five hundred officers at a time have received the benefit of these refresher courses in tactical training at Carlisle. Another three hundred officers per month have received refresher courses in hospital administration and

medical specialties at Army hospitals. The latter training includes forty exemplary and applicable courses in six different general hospitals. This instruction is aimed at familiarizing selected medical officers with the administrative routine of various military hospital staff positions, including commanding officer, executive officer, adjutant, registrar, mess officer, chiefs of services, section chiefs, ward officers and other hospital staff duties.

On July 1, 1941 an officer candidate school was established at Carlisle Barracks to train selected enlisted candidates for commission in the Medical Administrative Corps. The courses at this school last approximately three months and accommodate as many as two hundred and fifty students in each class.

Monthly courses in field sanitation are given at Carlisle to train enlisted sanitary technicians. Approximately one hundred enlisted men receive this instruction each month.

Nearly one thousand five hundred enlisted technicians are being trained each month in Army hospitals. This training is made available at six of the larger permanent Army hospitals. These enlisted student technicians receive special instruction in the work to which they will be assigned. The courses are intended to qualify selected enlisted men for assignment as technicians in x-ray, pharmacy, laboratory, veterinary, dental, medical and surgical services.

Twenty-four replacement training centers have been set up at twenty-one camps in various parts of the country. Newly inducted and volunteer recruits may be sent to these centers to receive basic military and tactical instruction in various branches of the service. Medical recruits, for example, are sent to one of three replacement centers, where they receive elementary individual training and at the same time are given instruction concerning Medical Department field units and installations.

I have stated that medical replacement centers have been established at Camp Lee, Va., Camp Grant, Ill., and Camp Barkeley, Texas. Medical Department soldiers who are not sent to one of these centers for the usual thirteen weeks of basic training receive equivalent elementary military instruction and training with the organizations to which they are assigned.

FIELD MEDICAL SERVICE

Time will not permit a discussion of medical field service organization or a comprehensive description of the more important Medical Department units that are designed to function in a theater of military operations. Briefly, these installations include, from front to rear:

Battalion and regimental aid stations to give prompt emergency treatment on the field of battle.

Collecting companies to carry the wounded from battalion areas to field hospitals, which are now known as "clearing stations."

Clearing stations (formerly called "field hospitals"), which provide necessary emergency surgical care, prepare casualties for further evacuation to the rear and return to duty those patients who are trivially wounded and not incapacitated.

Mobile surgical hospitals, which operate independently, adjacent to clearing stations, to care for extremely urgent cases and nontransportable wounded.

Evacuation hospitals, which are mobile and yet provide facilities for skilful surgical treatment of battle casualties in the combat zone.

Convalescent hospitals, near the front, where slightly wounded and sick may be detained with a view to their early return to combat units.

Convalescent camps behind the combat zone, to which rear area hospitals may send convalescing patients.

Medical supply depots in the theater of operations to receive, store and issue medical supplies and equipment for the field forces.

Field laboratories to render clinical and epidemiologic laboratory service.

Hospital trains and airplane ambulances to accomplish transfer and evacuation of patients behind the combat zone.

Station and general hospitals in theaters of operations to furnish definitive treatment and hospitalization behind the combat zone.

Each mobile surgical hospital contains, in addition to shelter, one mobile surgical unit, which possesses sufficient integral transport for its own movement, together with the necessary facilities for messing, supply and technical operation. There are two types of mobile surgical units, each with identical personnel and functions. One type moves its personnel and equipment by ordinary truck. The other type has four operating rooms, installed in a like number of bus or van type motor vehicles, in which the unit performs its technical functions.

During a great battle, such as the Meuse-Argonne in the first World War, the Medical Department may have under its immediate control more than one fourth of all the military personnel of a field force. For example, about 15 per cent of the force may become casualties, while more than 10 per cent of the force may be medical personnel required to care for the casualties, all under Medical Department control.

I have said nothing of our Army medical organization in the Philippines, Hawaii, Panama, Puerto Rico, Alaska or in the recently acquired military bases at Newfoundland, Iceland, Bermuda, Jamaica, Trinidad, British Guiana and elsewhere. Service beyond the continental limits of the United States is loosely referred to as "foreign service." Army medical men seldom dislike such assignments. Foreign service, despite its hardships, may be alluring in many ways. Furthermore, foreign service reveals to the medical officer many fascinating vistas for scientific research.

Beneath tropical skies and towering coconut palms at some of our Army outposts, medical men in uniform carry on a relentless battle against disease. Amid exotic surroundings, among strange peoples, on the fringes of deadly swamps and jungles, Army doctors are afforded professional opportunities which do not exist in the environments of our homeland.

Army medical service involves much more than professional attendance on the sick and injured. It is concerned with the organization, administration, supply, training, sanitation and field tactics of medical troops, as well as evacuation, professional care and proper disposition of military patients, at home and abroad.

Whatever may be his professional aptitude or accomplishments, the physician who seeks a career in the Army must ultimately embrace the entrancing subject of military medicine. He may do so eagerly and with devotion or he may be obliged to accept, reluctantly, the military responsibilities which are inevitable in such a career. It is on the trained medical officer that new doctors in uniform must lean heavily for advice and guidance in times of great national emergency. And it is on these new doctors, drawn into the Army from civil life, that the trained medical officer must rely for cooperation, common sense, sacrifice and professional skill.

Teamwork is a strong bulwark against inefficiency. The Medical Department, both in the zone of the interior and in the theater of operations, is one of the most important cogs in our military machine and indispensable to national defense. But it is only a part of the team. During the perilous times which lie ahead, I urge those of you who may serve in the Medical Department of the Army to cultivate the twin virtues patience and tolerance. Try to understand and cooperate with the military system. Its necessary complexities are often misunderstood, and at times misrepresented as gross inefficiency, especially by inexperienced critics. After all, it is our cherished democratic system which necessitates most of the red tape, delay and seemingly wasted motion. There is generally a good but perhaps obscure or incomprehensible reason for every action or inaction which so often irks the newcomer in the Army.

Medicomilitary enthusiasts, imbued more with tactical considerations than with tact, have in times past overstepped the bounds of common sense by admonishing the newly commissioned Army doctor, when he is assigned to field service, to forget that he is a doctor and to remember only his purely military problems. Such council, of course, can serve no useful purpose and is properly resented by medical men.

In closing, I would advise the physician who dons the Army uniform never to forget that he is a Doctor of Medicine. But he should recognize the fact that efficient military medical service often demands stern and perhaps heroic adherence to the doctrine of "the greatest good for the greatest number."

ORGANIZATION SECTION

MEDICAL LEGISLATION

MEDICAL BILLS IN CONGRESS

Changes in Status.—H. R. 4853 has been reported to the Senate, proposing to authorize the hospitalization of retired officers and enlisted men who are war veterans on a parity with other war veterans. H. R. 4905 has been reported to the Senate, proposing to facilitate standardization and uniformity of procedure relating to the determination of service connection of injuries or diseases alleged to have been incurred in or aggravated by active service in a war, campaign or expedition. H. R. 6135 was reported to the House with recommendation that it pass, proposing to authorize an additional appropriation of $150,000,000 to construct community facilities in defense areas, including hospitals, health centers and clinics. Subsequently the authorization for the additional appropriation contemplated by this bill was included in another pending bill, H. R. 6128, and that bill has passed the House.

Bills Introduced.—S. 2105, introduced by Senator Clark, Missouri, and H. R. 6196, introduced by Representative Bland, Virginia, propose that it shall be unlawful for any person to produce, manufacture, compound, possess, sell, give away, deal in, dispense, administer or transport marihuana in the Canal Zone except under a license issued by the governor of the Panama Canal. The governor will be authorized to issue any licenses necessary to permit such uses of marihuana as are related to its administration to patients by physicians, dentists, veterinary surgeons and other practitioners or to research, instruction or analysis. H. R. 5906, introduced by Representative Barden, North Carolina, proposes to authorize annually an additional appropriation of $5,000,000 to be allotted to the several states to provide for the promotion of vocational rehabilitation of persons disabled in industry or otherwise. The term "physically disabled persons" is defined to mean any person who by reason of a physical defect or infirmity, whether congenital or acquired by accident, injury or disease is, or may be expected to be, totally or partially incapacitated for remunerative occupation. The term "vocational rehabilitation" is defined to mean the rendering of any services necessary to the fitting of a physically disabled person for a remunerative occupation. H. R. 6116, introduced by Representative Van Zant, Pennsylvania, proposes to authorize the Administrator of Veterans' Affairs to insert a provision in all national service life insurance contracts granting the insured protection against permanent total disability occurring while his contract of insurance is in force. H. R. 6216, introduced by Representative Downs, Connecticut, proposes to extend the federal old age and survivors' insurance benefits provisions of the Social Security Act to include hospital employees, beginning July 1, 1942.

DISTRICT OF COLUMBIA

Change in Status.—H. R. 5694 has passed the House and Senate, proposing to prevent the sale of unwholesome food in the District of Columbia.

MEDICAL ECONOMIC ABSTRACTS

BRITISH COLUMBIA PREPAYMENT PLAN

The British Columbia Medical Association has organized a prepayment plan which became effective Nov. 1, 1940.[1]

The Medical Service Association is incorporated under the "Societies Act" and brings together along industrial lines those interested in medical care by prepayment—employees, employers and doctors. There are three classes of members—employee members, employer members and professional members. The employee members elect two directors, employer members and professional members each elect one director. This representative board of directors is elected by the membership at large and serves without pay. The Medical Service Association is a nonprofit service organization and all dues collected are used or held for providing services to its beneficiary members and their dependents. Not more than 10 per cent of the dues may be used for administrative expenses.

Medical and surgical care includes services rendered by any doctor of medicine in the province in the home, the doctor's office or the hospital, consultations, special medical services, such as x-ray, diagnostic aids, and laboratory examinations and the services of specialists. Thirty-five dollars is paid the doctor for obstetric services when the mother has been enrolled for ten months, including antepartum, confinement and postpartum care.

A fundamental principle adhered to in the development of the Medical Service Association has been that the paper work to be required of physicians should be kept at a minimum.

Payments are made to the doctors, not to the subscriber, and are at the rate of 75 per cent of the schedule of minimum fees of the College of Physicians and Surgeons.

For the period of operation the estimates of costs have been adequate to discharge the obligations of the Medical Service Association for medical, surgical and hospital care and to set aside a reserve for contingencies of 12 per cent of the dues.

The Medical Service Association now has nine hundred subscribers. The service has had to meet competition of contract practice and plans with salaried doctors, many of which are on a financial basis equivalent to poor relief costs. Negotiations are going on with hospital service plans to arrange for some type of cooperation.

1. MacEwen, S. Cameron: Medical Economics, address at the Session on Medical Economics, Annual Meeting of the British Columbia Medical Association, Sept. 16, 1941, Bull. Vancouver M. A. **17**:1 (Oct.) 1941.

WOMAN'S AUXILIARY

Arkansas

The auxiliary to the Bowie and Miller Counties Medical Society met for the first meeting of the current season at the home of Mrs. N. B. Daniel, September 26. Mrs. Calvin Churchill of Batesville, president of the state auxiliary and guest of honor, talked on health education, *Hygeia*, health legislation and student loan funds.

The public relations meeting, October 24, was in the form of a "Nutrition Forum." The Washington County auxiliary met September 2. Seven subscriptions for *Hygeia* were provided to county schools as a gift from the auxiliary.

West Virginia

The Woman's Auxiliary to the Academy of Medicine of Parkersburg opened their fall program at a joint meeting with the state auxiliary's executive board, October 8. The hostesses for the afternoon were Mrs. B. O. Robinson, Mrs. R. H. Wharton, Mrs. Athey Lutz and Mrs. A. C. Woofter. The local president introduced Mrs. Welch England. Mrs. V. E. Holcombe, formerly president of the national auxiliary, introduced Mrs. R. E. Mosiman of Seattle, president of the national auxiliary and guest speaker, whose subject was "Problems in Health Defense in Connection with Our National Defense Program."

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION AND PUBLIC HEALTH.)

ARIZONA

Annual Registration Due January 1.—Every person practicing medicine, surgery or osteopathy in Arizona is required by law to pay annually on or before January 1, to the board of medical examiners, a renewal license fee of $3. Any licentiate who does not renew his license as required is to be penalized $1 for each day that he practices without a renewal license, not to exceed $50. The board of medical examiners is to revoke the license of any licentiate who fails to renew his license for three successive years.

ARKANSAS

Annual Registration Due on or Before January 1.—All licentiates of the State Medical Board of the Arkansas Medical Society are required by law to register with the board on or before January 1 and at that time to pay such fee as has been set by the board. If a licentiate fails to pay the required annual fee before March 1 of any year his license to practice automatically expires but may be reinstated on the payment of all delinquent fees and a penalty of $1 for each year, or part thereof, of delinquency.

CALIFORNIA

Annual Registration Due January 1.—Every practitioner of medicine and surgery holding a license to practice in California is required by law to register annually, on or before January 1, with the secretary-treasurer of the board of medical examiners and at that time to pay a fee of $2. Failure to pay the required fee within sixty days after January 1 works a revocation of a license, and thereafter a license may be reissued only after application and the payment of a $10 penalty. The required fee, however, is waived with respect to licentiates serving in the armed forces of the United States or in the United States Public Health Service.

Chiropractor Lovaas Convicted of Practicing Surgery.—A. M. Lovaas, a Santa Ana chiropractor, was recently convicted in the Santa Ana justice court on three counts of violating the laws regulating the practice of medicine in that he attempted to remove the tonsils of a patient by electrocoagulation. The court said that this procedure constituted the practice of surgery and that the license that Lovaas held did not entitle him to engage in such practice. A fine of $250 was imposed on the first count and a jail sentence of thirty days on each of the remaining counts, the latter penalties being suspended during a probationary period. This case, it is reported, represents the first instance in which a California court has determined whether the removal of tonsils by electrocoagulation constitutes the practice of surgery.

CONNECTICUT

Annual Registration Due During January.—Every practitioner of medicine and surgery holding a license to practice in Connecticut is required by law to register during January with the state department of health and at that time to pay a fee of $2. Licentiates who have retired from active practice or who live out of the state must register annually but need not pay a fee. A practitioner failing to register is liable to a fine of not more than $5.

FLORIDA

Annual Registration Due January 1.—Every practitioner of medicine and surgery holding a license to practice in Florida is required by law to register annually on or before January 1 with the secretary of the state board of health and at that time to pay a fee of $1. A licentiate failing to register annually is liable to a fine of not more than $50.

ILLINOIS

Personal.—Dr. Raymond H. Runde, Mount Vernon, Mo., has been named medical director and superintendent of the Peoria County Tuberculosis Sanatorium district, with offices in Peoria, succeeding Dr. David F. Loewen, Decatur, who has held the position for three years. Dr. Loewen will occupy a similar position at the Macon County Tuberculosis Sanatorium district.

Conference on Public Health.—The annual Illinois Conference on Public Health was held in Springfield on December 4-5 with Dr. Roland R. Cross, state director of public health, as chairman. Among the speakers were:

Dr. Anton J. Carlson, Frank P. Hixon distinguished service professor emeritus of physiology, University of Chicago School of Medicine, Are Our Present Conceptions of Health and Disease Adequate?
Dr. Clarence D. Selby, Detroit, Industrial Hygiene in National Defense.
Dr. Clifford J. Barborka, Chicago, Nutritional Deficiencies and Public Health.
Henry T. Dean, D.D.S., dental surgeon, U. S. Public Health Service, Washington, D. C., Psychiatry and Public Health.
Dr. LeRoy M. Polvogt, Baltimore, Study of Impairment of Hearing in Children.

Chicago

Society News.—The Chicago Society of Internal Medicine was addressed, December 15, among others, by Drs. Paul H. Wosika, Frederic T. Jung and Chauncey C. Maher on "Does Urologic Hypertension Exist?" and Willard O. Thompson, Norris J. Heckel and Richard P. Morris, "Production of Skeletal and Somatic Aging in Young Boys with Chorionic Gonadotropin."——Dr. Jarrell Penn, Knoxville, Tenn., discussed "Treatment of Subtrochanteric Fractures of the Femur" before the Chicago Orthopaedic Society December 12 and Dr. Walter R. Fischer, "Management of the Food: An Orthopedic Responsibility."——The Illinois Psychiatric Society was addressed December 4 by Drs. Paul T. Cash, Omaha, on "Combined Curare-Electric Shock Therapy" and Ernest Lewy, Topeka, Kan., "Some Aspects of Compensation and War Neuroses."

IOWA

Personal.—Dr. Arthur Steindler, professor and head of orthopedic surgery, State University of Iowa College of Medicine, Iowa City, recently delivered twenty lectures in Spanish on orthopedic subjects and held several clinics in Mexico, under the auspices of the National University of Mexico, Mexico City.

Institute on Industrial Health.—A special institute on industrial health was conducted at Davenport, December 2, by the Iowa State Department of Health in cooperation with the speakers' bureau and the committee on industrial health of the Iowa State Medical Society for the practicing physician, the industrial physician and the industrial manager. Speakers included:

Dr. Clarence O. Sappington, Chicago, Medical Aspects of Industrial Hygiene; Medico-Legal Phases of Occupational Diseases.
Paul J. Houser, M.S., Des Moines, industrial hygiene engineer of the state department of health, Industrial Hygiene Methods.
Dr. Carey P. McCord, Detroit, Occupational Disease in Iowa; Organization and Costs of Medical Services in Industry.
Dr. Regnar M. Sorensen, Des Moines, Venereal Disease in Industry.
Dr. Philip H. Kreuscher, Chicago, Management of Industrial Injuries.
Dr. Eugene C. Wagner, Des Moines, Human Serum (pooled) in Shock and Hemorrhage.
Drs. Arthur Steindler and Frank E. Thornton, Iowa City, Low Back Pain: Diagnosis Before Treatment.
A. D. Matheson, Davenport, The Industrialist's Viewpoint.

The day's session concluded with a panel discussion participated in by these speakers and Dr. Walter L. Bierring, Des Moines, state health commissioner, and Dr. Howard A. Weis, Davenport, president of the Scott County Medical Society.

LOUISIANA

New Medical Officer at Veterans' Hospital.—Dr. Edward O. Sage, chief of the outpatient department at the Veterans' Administration Facility in Dearborn, Mich., has been made chief medical officer of the Veterans' Hospital, New Orleans, in charge of the entire Louisiana district. Dr. Sage had been with the Dearborn facility since 1922.

Personal.—Dr. Joseph C. Menendez, New Orleans, was recently appointed director of civilian defense in the Fourth Corps Area.——Dr. Mary Elizabeth Bass, New Orleans, was recently guest of honor at a banquet given by the local branch of the American Medical Women's Association. Dr. Bass was presented with a hand printed book containing the history of the local branch.

Society News.—The Orleans Parish Medical Society devoted its meeting, November 10, to a symposium on military medicine with the following speakers: Major Frank P. Rizzo, state medical officer, Louisiana Selective Service System, New Orleans; Lieut. Col. Samuel Charles Woldenberg, chief of surgical service, LaGarde General Hospital, New Orleans; Leo J. Schoeny, D.D.S., and Lieut. Comdr. James E. Fulghum, U. S. N. R., on duty with Naval Aviation Cadet Selection Board, New Orleans.

Annual Renewal Due January 1.—Every practitioner of medicine and surgery holding a certificate to practice in Louisiana is required by law to have his certificate renewed annually, on or before January 1, by the secretary-treasurer of the state board of medical examiners and at that time to pay a fee of $2. The board may by unanimous vote revoke any certificate not renewed.

MARYLAND

New Director of Tuberculosis.—Dr. Miriam E. Brailey, associate in epidemiology, Johns Hopkins University School of Hygiene and Public Health, Baltimore, has been appointed director of the bureau of tuberculosis of the city health department. Dr. Brailey graduated at Johns Hopkins University School of Medicine in 1930 and received the degree in public health the following year. In 1932 she became director of the outpatient clinic for tuberculous children in the Harriet Lane Home and joined the faculty of the school of hygiene and public health.

MICHIGAN

Wayne County Society Now Owns Its Home.—The Whitney Realty Company has presented the headquarters of the Wayne County Medical Society, 4421 Woodward Avenue, Detroit, to the society. The trustees and council of the society accepted the gift, and the membership unanimously voted its approval at a meeting on December 2. The house, which has been the society's headquarters rent free for ten years, will be known as "The David Whitney House." It was built by Mr. David Whitney, contains fifty rooms, and is famous for its carved wood and parquet floors, stained glass windows and twenty fire places. *Detroit Medical News*, the society's bulletin, carried special tributes in its December 8 issue to the Whitney Realty Company in appreciation of this magnanimous gift.

MINNESOTA

Annual Registration Due During January.—Every practitioner of medicine and surgery holding a license to practice in Minnesota is required by law to register annually during January with the secretary of the board of medical examiners and at that time to pay a fee of $2. A licentiate who practices without renewing his license is guilty of a misdemeanor and is liable to prosecution.

NEW JERSEY

Organize to Promote Moral and Physical Health.—A group of ministers and physicians met in West Orange on December 4 to discuss the organization of a clinic to promote the moral, spiritual and physical health of their community. The session was under the chairmanship of Rev. Dr. John A. MacSporran, president emeritus of the Hillside Presbyterian Church of Orange and extension secretary of the Committee on Religion and Health of the Federal Council of the Churches of Christ in America, cooperating with Drs. James S. Plant, director of the Juvenile Court of Newark, Theodore R. Ford, East Orange, and Briscoe B. Ranson Jr., East Orange. Definite plans were to be made at the meeting to hold a series of seminars in January at which the working organization was to be set up, newspapers reported. It is believed that the plan will assist the physician in teaching the minister to recognize symptoms of mental maladjustment and aid the minister in contributing to the physician's understanding of the situations that lead to mental disturbance and their frequent basis in spiritual sterility.

NEW YORK

Foods for Freedom Parade.—The nutrition defense committee of Rochester and Monroe County sponsored a foods for freedom parade in the Civics Exhibit Building, November 15-19. About sixty exhibits showed the composition of the human body, its needs and how these needs are met by different foods. In the evening the program included music by school orchestras and a lecture on nutrition. Health movies were shown continuously afternoon and evening.

Annual Registration Due January 1.—Every practitioner of medicine and surgery in New York is required by law to apply annually, on or before January 1, to the secretary of the board of medical examiners for a certificate of registration, on application forms furnished by him, and to pay at that time a fee of $2. The law authorizes the secretary of the board to permit secretaries of duly incorporated medical societies to act as his representatives to receive and transmit to him such applications and fees. Practitioners are liable to severe penalties for failing to register and for continuing in practice thereafter.

Civilian Defense Program to Safeguard Water Supplies.—The statewide civilian defense plan to prepare New York state municipalities for maintaining effective and safe water service under any emergencies started on October 31, when zone water supply coordinators and assistant coordinators from all sections of the state met in the state office building, Albany. The state has been divided into twenty-three water service zones, nineteen of which are coterminous with the nineteen state health districts. The other four comprise New York City and Nassau, Suffolk and Westchester counties. Earl Devendorf, assistant director of the division of sanitation, state department of health, has been named state water supply coordinator. The deputy commissioner of health and sanitary engineer of the New York City Department of Health, county sanitary engineers of the departments of health of Westchester, Suffolk and Nassau counties and the nineteen district sanitary engineers of the state department of health have been made assistant coordinators. Water supply coordinators will determine which municipalities and industries should have their water supplies interconnected and work with local water officials in effecting the interconnections.

Conference on Chemotherapy.—The New York State Department of Health and the state medical society sponsored a conference on chemotherapy in Albany, October 7-8, with the following speakers:

Dr. Eli K. Marshall Jr., Baltimore, Chemistry, Absorption, Distribution, Conjugation and Excretion of Sulfonamides.
Dr. Colin M. MacLeod, New York, Action of Sulfonamides on Bacteria in Role of Immunity in the Response to Chemotherapy.
Dr. John K. Miller, Albany, the Approved Laboratory in New York State in Relation to Chemotherapy.
Dr. William Barry Wood Jr., Baltimore, Modes of Administration and Preparation of Solutions.
Dr. Maxwell Finland, Boston, Toxicity and Follow-Up of Patients.
Dr. Chester S. Keefer, Boston, Clinical Use of Gramicidin and Penicillin.
Dr. Norman H. Plummer, New York, Pneumonia.
Dr. Cassius J. Van Slyke, Washington, D. C., Gonorrhea.
Dr. Edwin P. Alyea, Durham, N. C., Infections of the Urinary Tract.
Dr. John S. Lockwood, Philadelphia, Sulfonamides in Surgery—Local and General Use.
Dr. Benjamin W. Carey, Pearl River, Use of Sulfonamides in Pediatrics.
Dr. John H. Dingle, Boston, Treatment of Meningitis.

The conference was planned primarily in order that authoritative opinions on the best usage of these drugs would be directly accessible to a speakers' committee appointed by the state medical society. This committee will be available throughout the fall and winter to give a course on sulfanilamide, sulfapyridine and related compounds to county medical societies, hospital staffs and other medical groups.

New York City

Third Harvey Lecture.—Dr. Robert F. Loeb, professor of medicine at Columbia University College of Physicians and Surgeons, delivered the third Harvey Society Lecture of the current series at the New York Academy of Medicine, December 18. His subject was "The Adrenal Cortex and Electrolyte Behavior."

Medical Service Plan for Ward Patients.—The Community Ward Service Plan, administered by the Associated Hospital Service under the direction of Dr. Sigismund S. Goldwater, was to start operating November 1, according to the New York *Times*. It is intended to provide hospital ward service and medical care on a contributory basis to persons with limited incomes, who would ordinarily be eligible for admission to the ward service of participating hospitals. Those eligible are employed single persons with incomes of $1,200 a year or less, husband and wife with income of no more than $1,680 a year, and families, including children, with incomes of no more than $2,100 a year. Enrolment is permitted only on a group basis and premiums will be collected through payroll deductions. The subscription charges for the combined medical and hospital services are $12 a year for individual subscribers and $27 annually for families including all unmarried children under 18 years. The family subscription will provide maternity care as well as general medical services. Hospital services will include ward accommodations in participating hospitals for a period of twenty-one days, except in maternity cases, in which the period is limited to ten days. Services will include, in addition to bed and board and prescribed diets, general nursing care, operating room, delivery room, dressings, medications, drugs, anesthesia, physical therapy, cardiographic, cystoscopic, x-ray and laboratory examinations and all other essential services. At present the area covered

by the plan includes the five boroughs of New York City, Westchester, Nassau and Suffolk counties in Long Island, and Putnam, Dutchess, Columbia, Ulster, Orange, Rockland, Sullivan, Delaware and Greene counties adjacent to New York City.

NORTH DAKOTA

Annual Registration Due January 1.—Every practitioner of medicine and surgery holding a license to practice in North Dakota is required by law to register annually on or before January 1 with the secretary-treasurer of the board of medical examiners and at that time to pay a fee of $5, if a resident of North Dakota, or $2, if a nonresident. A practitioner may not lawfully practice if he has not registered. If he does so his license may be revoked and can be reinstated on the payment of unpaid fees and $0.50 for each month of default.

OHIO

Monument Honors Memory of Physician.—The Logan County Medical Society, the Logan County Historical Society and the American Legion participated in the dedication near Middleburg recently of a granite monument to the memory of Dr. Phoebe Haines Sharp, who was the first physician to practice in Logan County. According to the *Ohio State Medical Journal* Dr. Sharp, who came to Logan County with her parents in 1801, was also the founder of the first school and the first church (Friends) in that section of the state. The monument is erected near the place of her burial. As part of the dedication ceremonies Dr. Lee E. Traul, Middleburg, representing the county medical society, related the progress of the medical profession in the county.

PENNSYLVANIA

Annual Registration Due January 1.—Every practitioner of medicine and surgery holding a license to practice in Pennsylvania is required by law to register annually, on or before January 1, with the board of medical education and licensure in the department of public instruction and to pay a fee of $1 or such fee as may be fixed by the department of public instruction. A practitioner who fails to register and who continues to practice is liable to a fine of from $10 to $100.

Health Institute.—The second Pennsylvania Health Institute will be held at the Penn Harris Hotel, Harrisburg, January 14-16, under the auspices of the state department of health and cooperating health agencies. Included among the speakers will be:

Dr. Benjamin F. Jones, Bethesda, Md., Fatigue as a Problem of Industrial Health.
Dr. Frank G. Boudreau, New York, Nutrition as a Problem of Industrial Health.
Dr. James G. Townsend, Bethesda, Md., Industrial Health at the States' Level.
Dr. C. Charles Burlingame, Hartford, Conn., Relation of the Public to Mental Health.
Dr. Hubley R. Owen, Philadelphia, Aim of Local Health Administration in Preventive Medicine.
Dr. Wilson C. Williams, Nashville, Tenn., Relationship of the State in Local Health Work.
Dr. Robert B. Osgood, Boston, Public Health Aspects of Chronic Rheumatism.
Dr. Elliott P. Joslin, Boston, What Is the Place of Diabetes in a Public Health Program?
Ira Hiscock, C.P.H., New Haven, A Coordinated Program of Health Education for the Community.
Lon W. Morrey, D.D.S., Chicago, Dental Health Education in the Schools.

Philadelphia

The Mutter Lecture.—Dr. Walter L. Palmer, professor of medicine, University of Chicago School of Medicine, Chicago, delivered the fifty-fourth Thomas Dent Mutter Lecture before the College of Physicians of Philadelphia December 3. His subject was "The Role of Acid Gastric Juice in Gastric and Duodenal Ulceration."

National Defense Night.—The Philadelphia County Medical Society designated its December 10 meeting "National Defense Night." The following program was presented:

Dr. Hubley R. Owen, General Activities of the Philadelphia Defense Council.
Dr. Rufus S. Reeves, Role of the Physician in Local Disasters.
Col. Leonard G. Rowntree, medical director, Selective Service System, Washington, D. C., Results of Examination of Registrants and Their Rehabilitation.
Dr. Edward A. Strecker, Neuropsychiatric Problems in the Military Service.
Major General James C. Magee, surgeon general, U. S. Army, Washington, D. C., Review of Operations of the Medical Department in the Emergency.

School Health Meetings.—The American Academy of Pediatrics through its Pennsylvania committees announces the success of a new method to elicit interest of parents and teachers in the health of young children. A series of panel discussions was held in eleven selected schools in and near Philadelphia. The program also included presentations by the local school orchestra, words of introduction by well known school or other leaders and the showing of the talking movie "Bobby Goes to School." Each panel consisted of a chairman and four associate pediatricians and in some cases an educator and a nurse. Each chairman was equipped with questions received from parents or teachers in advance or preselected as suggestive questions by panel members after the panel was started. Questions were invited from the floor on child health and school health problems. The meetings were timely because they were held at an early period in the school year when parents and teachers have to face a winter of possible infections and health is an important consideration. Eleven meetings in eleven schools reported an attendance of 175, 550, 500, 525, 500, 175, 125, 800, 1,000, 250 and 400, making a total of 5,000 consisting mostly of parents, teachers, doctors, social workers and nurses who attended these "Going to School Health Meetings." Plans are now being considered for a follow-up program to rivet the value of these meetings.

Pittsburgh

Mellon Institute Chemist Receives Remington Medal.—George D. Beal, Ph.D., assistant director of the Mellon Institute for Industrial Research since 1926, was awarded the Remington Medal of the American Pharmaceutical Association for 1941 at a dinner given by the New York branch at the Hotel Pennsylvania on December 4. Dr. Beal received the degree of doctor of pharmacy at Scio College, Scio, Ohio, in 1907 and doctor of philosophy at Columbia University, New York, in 1911. From 1911 to 1926 he was on the faculty of the University of Illinois, Urbana, becoming professor of analytic and food chemistry in 1924. He is a member of the Committee of Revision of the U. S. Pharmacopeia. In 1937 Dr. Beal was president of the American Pharmaceutical Association and in 1920 received the Ebert Prize awarded by the association.

TEXAS

Appointment at Texas.—Dr. Carl A. Nau, formerly director of the Texas division of industrial hygiene, is now professor of physiology and preventive medicine and head of the department, University of Texas School of Medicine, Galveston, it was recently announced. Dr. Nau graduated at Rush Medical College, Chicago, in 1935.

Annual Registration Due January 1.—Every practitioner of medicine and surgery holding a license to practice in Texas is required by law to register annually on or before January 1 with the state board of medical examiners and at that time to pay a fee of $2. If a practitioner fails to renew his registration within sixty days after January 1, his license is suspended.

GENERAL

New Study on Alcohol Problems.—The Research Council on Problems of Alcohol will undertake a study of basic disorders and environmental factors that cause excessive drinking and the problem of alcoholism as it might affect industrial production, according to an announcement made at its annual meeting, November 25, in New York. One of eight group sessions was devoted to this phase of alcoholism. Dr. Winfred Overholser, Washington, D. C., was reelected chairman of the council's board and Dr. I. Ogden Woodruff, New York, was elected vice chairman.

Dr. Rappleye Named President of Macy Foundation.—Dr. Willard C. Rappleye, commissioner of hospitals of the city of New York, and dean and professor of medical economics, Columbia University College of Physicians and Surgeons, has been elected president of the Josiah Macy Jr. Foundation, New York, effective January 1, to succeed the late Dr. Ludwig W. Kast. The foundation is organized to further medical education. Dr. Frank Fremont-Smith is director of the medical division. For the four years 1937-1940 a report showed cash disbursements of $951,512 for health studies and research.

New Annual Award in Urology.—The American Urological Association announces the establishment of an annual award, not to exceed $500, for an essay (or essays) on the result of some specific clinical or laboratory research in urology. The amount of the prize will be determined on merits of the work presented, and, if the committee on scientific research of the association deems none of the work submitted worthy, no award will be made. Competitors shall be limited to residents in urology in recognized hospitals and to urologists who have been in such specific practice for not more than five years. Essays must reach the secretary, Dr. Clyde L. Deming, 789

Howard Avenue, New Haven, on or before April 1, 1942. The American Urological Association's principal object is "to encourage the study, improve the practice, elevate the standards and advance the cause of urology."

Annual Campaign for Infantile Paralysis Funds.—January 12 will mark the official opening of the annual campaign for funds to support activities of the National Foundation for Infantile Paralysis. On January 30, designated the Diamond Jubilee Birthday Celebration, birthday balls throughout the country will observe President Roosevelt's sixtieth birthday. National and local chairmen of the National Foundation for Infantile Paralysis met in annual session in Washington, December 2, to discuss plans for the forthcoming campaign and to hear reports on the foundation's activities of the past year in various states where severe epidemics of the disease were reported. During 1939, 1940 and 1941 nearly 26,000 persons have been stricken with infantile paralysis, it was stated. A percentage of the total funds collected in the annual drive is returned to the states for local aid, the remainder being retained by the National Foundation for maintenance, grants in aid and other projects.

Bibliography of Pharmacology and Chemotherapy.—Beginning with volume 3 (1942) the name of the *Bibliography of Pharmacology* is changed to *Bibliography of Pharmacology and Chemotherapy*. No change in scope is contemplated; "Chemotherapy" is added only to make the title more accurately descriptive. The *Bibliography's* field is defined thus: "A reference list of current American and foreign literature relating to the action of known chemical compounds (natural or synthetic) on animal organisms and to therapeutic use of such compounds, including clinical investigations but not including routine clinical and case reports." Format will be modified by heading each entry with a blank line for insertion of the subscriber's own index heading, as an aid to those who mount clipped *Bibliography* items on index cards. Below this line each entry will begin with an optional index heading (in capitals) selected by the compiler. The annual subscription rate is $3.50, or $2.50 to members of the Friends of the Hooker Scientific Library. Requests for more information or for a specimen page may be addressed to the Hooker Scientific Library, Central College, Fayette, Mo.

Fellowships in the Medical Sciences.—Fellowships in the medical sciences, similar to those which have been administered by the Medical Fellowship Board of the National Research Council since 1922, will again be available for the year beginning July 1, 1942. These fellowships, supported by grants from the Rockefeller Foundation to the National Research Council, are designed to provide opportunities for training and experience in research in all branches of medical science. They are open to citizens of the United States or Canada who possess an M.D. or a Ph.D. degree and are intended for recent graduates who are not yet professionally established. In addition to these fellowships the Medical Fellowship Board administers two groups of research fellowships, made available through a grant from the National Foundation for Infantile Paralysis, Inc. The first group, open to applicants who hold either the Ph.D. or the M.D. degree, is to provide opportunities for special training and experience in the study of filtrable viruses. The second group, open only to graduates in medicine who have completed one or more years of hospital experience in clinical surgery and are planning a career in orthopedic surgery, will provide opportunities for training and research in those basic medical sciences which will be of value in furthering progress in the field of orthopedic surgery. Fellows will be appointed at a meeting of the Medical Fellowship Board on February 28. Applications to receive consideration at this meeting must be filed on or before January 1. Appointments may begin on any date determined by the board. For further particulars address the Secretary of the Medical Fellowship Board, National Research Council, 2101 Constitution Avenue, Washington, D. C.

Hunt for Home and Farm Accident Causes.—The American Red Cross launched a five day "hazard hunt" on October 26 for the elimination of home accident causes, which in 1940 claimed thirty-three thousand lives, according to a release. The survey was to be conducted through the distribution of ten million "check lists," an index of hazards designed to help the householder locate and eliminate the dangers. A similar index, listing accident hazards of the farm, was to be distributed in rural sections. Teachers were provided with special material to interpret the "check lists" to enable school children to assist their parents in the "hazard hunt." The release also announced plans to sponsor accident prevention courses through the three thousand seven hundred chapters of the Red Cross, which is the first national program of its type to be undertaken by the organization. A minimum of nine hours' instruction will be required for courses in home accident prevention and twelve hours to include farm accident prevention.

In reporting on its "hazard hunt," the Red Cross stated in addition to the thirty-three thousand deaths last year from home accidents, there were four thousand five hundred persons who died as a result of occupational mishaps on the farm. An estimated five million persons suffered home injuries involving hospitalization or treatment by a physician. Statistics provided by the National Safety Council reveal that more than half of all home accident deaths last year resulted from falls occurring on stairs, slippery floors, insecure rugs as a result of poor lighting and the use of chairs and other articles of furniture as improvised stepladders. Burns and accidental poisoning as causes of death were next in order. The mounting farm accident toll was attributed to mechanization of the American farm. Ill tempered animals was the second cause in this classification. Estimates place the number of "serious" type injuries at fifty for each farm accident death, a national total of two hundred and twenty-five thousand disabling injuries, the release stated.

CANADA

University News.—The Rockefeller Foundation has granted $25,000 to McGill University Faculty of Medicine, Montreal, for research in endocrinology for five years under the direction of Dr. John S. L. Browne, assistant professor of medicine and pathologic chemistry, *Science* reports.

Officers of British Columbia Association.—Dr. Cecil H. Hankinson, Prince Rupert, was elected president of the British Columbia Medical Association at its recent meeting in Vancouver. Other officers are Drs. Alfred H. Spohn, Vancouver, and Philip A. C. Cousland, Victoria, vice presidents; Allen Y. McNair, Vancouver, honorary secretary-treasurer, and Morris W. Thomas, Vancouver, executive secretary. The association is the British Columbia division of the Canadian Medical Association.

New Publication on Biology.—The Société de Biologie de Montréal has announced the publication of a review which will be its official organ and which will contain also reports of research. The membership of the society includes physicians, physiologists, biochemists, pharmacologists, bacteriologists, zoologists and others. The *Revue canadienne de biologie*, which will be published in French, will appear under the auspices of the Université de Montréal. The society held its first meeting of the year recently in the laboratory of physiology at the university.

Personal.—Dr. Edmund Arnold G. Branch, Montreal, has been appointed director of the Provincial Bureau of Laboratories of New Brunswick. He succeeds Dr. Robert A. H. MacKeen, St. John, who has been named pathologist to Camp Sussex Hospital, an active service commission with the Royal Canadian Army Medical Corps. Dr. Branch has worked with the Rockefeller Institute, New York, Harvard Medical School, Boston, and McGill University Faculty of Medicine, Montreal. ——Dr. Charles H. Best, professor and head of the department of physiology, and director of the Banting-Best Department of Medical Research, University of Toronto Faculty of Medicine, has been appointed honorary lieutenant-commander of the Royal Canadian Navy.

FOREIGN

Personal.—Dr. Leonard Gregory Parsons, professor of infant hygiene and the diseases of children, University of Birmingham Faculty of Medicine, Birmingham, England, who has been acting as deputy dean, has been named dean, succeeding Dr. Arthur Stanley Barnes, who resigned after serving for ten years, according to *Science*.

A Morison Shelter in His House.—A British correspondent writes on October 3: "Things are very quiet here now. We have had no air raid of any importance on London for many months. Severe damage has been done in many places, some of it irreparable in the case of historic buildings and the Museum of the Royal College of Surgeons, which I have described in my letters. But London is so vast that the damage is very small in proportion to the whole—nothing like 1 per cent I should say. We expect some trouble in the coming winter from the Luftwaffe, but not on the previous scale. For one thing they will probably be too busy elsewhere and for another they should have to pay more dearly for whatever they do. I have a Morison shelter in my house. It is an iron table guaranteed to hold up 73 tons. If the house should come down, those under the table cannot be crushed to death by the débris. I need not say we are all full of calm confidence in the future. We were that in our darkest hour when we stood alone after the collapse of France."

Foreign Letters

LONDON

(From Our Regular Correspondent)

Nov. 1, 1941.

Medical Aspect of the Problem of High Production

All our energies are being put into our war effort with the object of the maximum of industrial production. But, being a free country, we have our critics. At a recent meeting of engineers to consider war production Mr. E. C. Gordon, chairman of the Engineering Industries Association, criticized output, stating that production in engineering industries, measured by square foot of factory space or pound weight of product per hour, has declined. To this criticism a leading physician, Dr. J. A. Ryle, professor of medicine in the University of Cambridge, has replied in the *Times*. He wonders whether it occurred to Gordon's audience to remember that other measurements besides square foot of factory space and pound weight of product per hour must be taken into account if a true assessment of causes and effects is to be reached and that the human machine, however willing, when called on to contribute "every available man hour" produces less—except over short periods of drive—than the human machine handled according to the rules which physicians, physiologists and psychologists have prescribed after careful study. Experience and experiment in times of peace and during the last war have clearly shown that during prolonged periods of pressure industrial fatigue results in falling output, and that output again increases when hours are shortened, proper rest periods are instituted and a sufficiency of holiday is allowed. After the evacuation of Dunkirk a general speed up became imperative for many months, but the rising tempo of the war has continued to demand a rising tempo of production. Long hours and overtime, the monotony of repetitive work, noise, journeys from and to the factory, private and public anxieties and rationing, not to mention patriotic zeal itself, have begun to have their anticipated effect on muscle and nerve and mind. Is sufficient attempt being made to counter these adverse forces?

The symptoms of industrial fatigue include bodily and mental weariness, poor sleep, flagging digestion or appetite, irritability or depression and a slowing up of movements and of memory. They commonly appear first in "the willing horse," that is, the more conscientious and efficient worker. These symptoms cannot be quantitatively assessed. The measurable symptom is falling output. Engineers are scientifically minded and should appreciate the contributions to knowledge made by their scientific colleagues, whose study is that of the most intricate and valuable of all machines—the human body. Professor Ryle feels sure that he would have the support of the whole medical profession in urging on the government the importance of this very vital aspect of the production problem.

Ocular Injuries in the War

At the annual congress of the Ophthalmological Society a discussion took place on the experiences of ocular injury in the war. O. M. Duthie said that ruptures had proved the most frequent of all serious injuries. Even when the injury was not severe the end results were deplorable. Many cases of rupture, especially those due to flying glass, were virtually untreatable. Subconjunctival ruptures, with or without dislocation of the lens, were not infrequent.

Solly Zuckerman restricted himself to civilian air raid casualties and dealt with injuries supposed to be due to blast. He had studied the records of the last war and found nothing to suggest that changes in the eyeball were produced by blast. At relatively high pressures, to be experienced only close to the bomb, changes, of which the most common was retrobulbar hemorrhage, would occur, but such cases would probably end fatally in any event.

E. B. Alabaster analyzed 100 cases of eye injury admitted to a casualty hospital after air raids. Of these, 60 were cases of traumatic conjunctivitis, 21 were penetrating wounds caused by metal or glass, 6 were corneal abrasions, 5 were subconjunctival hemorrhage, 5 were injuries only to the lids and there was 1 case each of central retinal block, detached retina and orbital cellulitis. Of the 21 cases of penetrating wounds, 12 required enucleation of the eye.

Herbert Caiger said that nothing had brought home to him the horror of this war so much as the case of a man, aged 66, injured in a shelter. One eye was absent and the man declared that it had been blown right out of its socket, while the other eye showed detachment of the retina.

R. C. Davenport and others referred to the frequency with which intraocular foreign bodies were found to be nonmagnetic, in keeping with the low ferrous content of shell and bomb cases used in this war.

EYE PROTECTION IN WARFARE

Sir Richard Cruise said that at least 50 per cent of eye injuries such as ophthalmic surgeons saw in the last war could be prevented by some form of practical eye protection. As reported previously in THE JOURNAL (June 15, 1940, p. 2397) he has introduced a visor. It was urged against it that visibility was seriously impeded. Even if this were so, the visor need not be lowered on any occasion when it is likely to handicap the wearer. Harrison Butler pleaded for the use of an official visor not only for soldiers but for fire watchers and others engaged in civilian protection. The question was remitted to the council of the society to consider taking up with the Ministry of Home Security the issue of some form of eye protection along with the steel helmet for civilians.

Immediate Training of the Disabled

Heretofore there has been an interval after the discharge of disabled men from the hospital when they have been no one's particular care. Their medical and surgical treatment has ended before the business of restoring them to employment has begun. Mr. Bevin, minister of labor and National Service, has prepared a scheme which remedies this. No time will be lost in the training and resettlement in industry of persons disabled while on war service or in civil life. The scheme is designed to cover all disablement however caused—by wounds, industrial or other accidents or disease. It will be open to all persons over 16 who are unfitted by disablement from resuming their normal occupation as well as those who are handicapped by disablement from obtaining satisfactory employment. During the war it will be necessary to concentrate on training for occupations which are in demand in war time. From the patients themselves and from their physicians, individual requirements of employment will be ascertained, and possibly the expected employment may influence the process of rehabilitation. By making contact with a patient before completion of his hospital treatment, the Ministry of Labor will be able to interest itself in his future much earlier, and his return to employment will be made easier and quicker. Under present arrangements both men and women are already being trained in government training centers and technical colleges or with employers for various kinds of munition work. Many of these occupations are suitable for disabled persons. The new scheme puts them in the first and immediate category. Training allowances will be paid to men at the rate of $8 and to women at the rate of $6 a week. The juvenile rates are $4 for boys and $3.50 for girls. In addition, a person being trained is given a midday meal.

Ammonia and the Gas Mask

The government states that the gas mask which is issued to all civilians will protect against any gas likely to be used by the enemy. Ammonia is not in this class, and the masks are not designed for protection against it. But in an accident in an air raid which occurred a year ago it was found that some protection is afforded. The connecting pipe of an ammonia condenser was punctured by a fragment of flying metal and seventy-five persons in a crowded shelter suffered from inhaling the ammonia. Seven of them died. But no one wearing a gas mask, whether a member of a first aid party called in to help or a sheltereer who had the sense to don his mask on the first experience of the acrid smell, suffered. In the pamphlet of instruction the Ministry of Home Security states that the gas masks, although not designed for the purpose, do afford some protection against ammonia. But it subsequently issued a warning on this point. Though they give some protection against the immediate danger from ammonia, when worn subsequently ammonia is liberated from the container in concentrations which may produce serious discomfort or even be dangerous. This effect occurs even when gas free air is drawn through the mask, and if it should occur in the presence of war gas the wearer is completely deprived of protection. He cannot wear the mask because of the ammonia given off as he breathes through the container and so will be exposed to the war gas. The gas mask should therefore not be relied on for protection against ammonia. If in an emergency it has to be worn while escaping from an area seriously contaminated with ammonia, a fresh container should be substituted for the old one as soon as possible.

The Influence of War on Surgery

In a lecture on the influence of war on surgery Mr. Zachary Cope said that surgery had always been an art but only recently a science. Up to the time of Harvey's discovery of the circulation of the blood it was a crude art, and for the most part surgeons learned their lessons on the battlefield. It was in the Franco-Prussian war of 1870 that antiseptics were given their first big trial. Modern wars were on so large a scale that they provided unparalleled opportunities for the trial of new remedies. The intensive research necessitated by the demands of war might concentrate within a year what would usually take ten years to do.

In the last great war the prevention of tetanus by specific serum was standardized and the treatment of shock and hemorrhage by blood transfusion made readily available. That war was also the chief means of putting thoracic surgery on its present sound foundation. Even more striking was the rapid and wonderful development of plastic surgery.

In the Spanish civil war the main advance was the discovery by Trueta that wounds treated by excision and encasement in plaster healed better than those treated by splinting and daily dressing. The present war had already provided important contributions to surgery. The work of Colebrook on the local antiseptic action of the sulfonamides and the experimental results of Zuckerman's researches on the effect of blast were noteworthy.

The Nutrition Society

The people of Britain have not allowed the war to prevent progress in many directions. Of this the latest example is the foundation of the Nutrition Society. Before the war the need for such a society was often discussed by workers on nutritional research, and a year ago informal meetings of about twenty representatives of the principal laboratories began. A provisional committee consisting of representatives of hospital schools, schools of agriculture and nutrition research laboratories, with Sir John Orr, F.R.S., as chairman, has been formed. About two hundred and thirty scientists who have been working on nutrition have been invited to become original members. Of these about fifty are medical men and women. During the war the society will hold meetings at various research institutes. The first meeting has been held at Cambridge and was opened by an introductory address by Sir Gowland Hopkins, F.R.S. Louis Harris, A. M. Sinclair, John Yudkin and G. W. Robertson discussed "Assessment of the Level of Nutrition in Man"; B. S. Platt, R. H. Dobbs and W. C. W. Nixon, "Clinical Signs of Dietary Deficiency"; C. K. Crowther, H. H. Green and John Hammond, F.R.S., vice chairman of the society, "Nutrition of Farm Animals." An open discussion followed. The new society performs the valuable service of bringing into touch with one another workers in various fields. It has been difficult for the clinician to keep up with the advances of the biochemist or the agriculturist planning production to make full use of the knowledge of the dietitian for the community's needs. Here is the remedy.

Rose Hips as a Source of Vitamins

We are producing much more food by extending our agriculture. We are also turning attention to wild products not normally used in any quantity. Plans have been made by the Ministry of Health to harvest the vitamin wealth of our hedgerows in the form of the hips of the wild rose, which are particularly rich in vitamin C, twenty times richer than oranges. Their collection is being organized through schools, boy scouts, girl guides and women's institutes. The hips will be used to make a syrup for the benefit of adults as well as of babies and children. They will also be made into a purée, which will be converted into jam by the addition of sugar. According to a bulletin issued by the Children's Nutrition Council the purée should contain 160 to 600 mg. of ascorbic acid per hundred grams and the jam 130 to 230 mg. Thus there should be at least three 50 mg. doses of ascorbic acid in slightly over 3 ounces of jam. Half an ounce eaten daily with bread would provide a useful supplement to the vitamins obtained in the normal diet. It is interesting that rose hips are a traditional food of European peasants.

Anglo-Soviet Medical Cooperation

The formation of the Anglo-Soviet Medical Committee was reported in a previous letter. An executive committee formed to carry out the plans reports that twenty-six physicians have volunteered to help in translation from Russian. The Society for Cultural Relations with Russia has handed over all its medical literature to the committee. The task has arisen of advising lay organizations on the purchase of medical supplies for Russia. The committee will accept responsibility for giving such advice but will not be responsible for making purchases or arranging shipments. Welsh miners have raised $300,000 for this purpose. Lord Dawson and Lord Horder suggested that the committee should work with the Red Cross in this matter. A subcommittee was appointed to explore the situation and give advice.

Reduction in Air Raid Casualties

The Ministry of Home Security announces the civilian casualties in air raids in September as 217 killed and 269 injured and detained in the hospital. A year ago the corresponding figures were 6,955 killed and 10,624 injured. For September 1941 the killed or missing numbered 87 men, 73 women, 45 persons under 16 and 12 unclassified. The number hospitalized included 129 men, 111 women and 29 persons under 16. In the first six months of 1941 18,698 persons were killed and 20,451 injured. The maximum number in one month was reached in April, when 6,131 were killed and 6,900 injured. The great reduction since that time is due mainly to a falling off in attacks from the air.

A Veteran Pediatrician

Sir Thomas Barlow, the eminent pediatrician, celebrated his ninety-sixth birthday on September 4. He is still up and about and is appreciative of the good wishes of his admirers.

RIO DE JANEIRO

(From Our Regular Correspondent)

Oct. 18, 1941.

A New Face Reflex

A new face reflex is described by Austregésilo Filho of Rio de Janeiro. It is elicited by the percussion of the cheek. When positive, there is contracture of the orbicularis of the upper lip. This contracture may be on the same side (homolateral), both sides (bilateral) or opposite side (heterolateral). It is found in emotional patients without pathologic evidences and in phychoneurotic patients, in neurasthenia. When the reflex is absent on one side in patients with increased intracranial pressure it is suggestive of a lesion on the posterior fossa. The reflex also disappears on one side in cases of symptomatic trigeminal neuralgia.

Austregésilo has studied the condition for fifteen years and his conclusions are based on the examination of 500 patients.

Vaccination Against Tuberculosis

The administration of BCG vaccine against tuberculosis is widely practiced in the large Brazilian cities; even in many towns of the interior of the country its use is increasing constantly. In Pelotas, Rio Grande do Sul, whose population is estimated around 95,000 inhabitants, 78.86 per cent of newborn infants received BCG in 1940, while the rate for 5 years ago was only 25.30 per cent. The BCG service began here in 1933, when 3.97 per cent of the children were submitted to this form of immunization. The accompanying table demonstrates how widely this method of prevention has been accepted by the people:

Infants Who Received BCG

Year	Per Cent
1933	3.97
1934	14.26
1935	18.46
1936	25.30
1937	29.71
1938	33.33
1939	60.25
1940	78.86

Arlindo de Assis of Nicteroi, Rio de Janeiro, who was the pioneer of BCG vaccination in Brazil, accomplished some researches on hyperallergic tuberculin tests following peroral immunization against tuberculosis. One hundred and forty-six infants and children aged from 2 months to 14 years were tested with old tuberculin by the Pirquet and Mantoux methods. None of them reacted to 2 mg. of tuberculin in intradermal injection. Roentgenologic research proved that none had pulmonary tuberculosis. Then they were given 200 mg. of living BCG a month, fasting in the morning. After twelve months 40 children (27.38 per cent) remained nonreactors to tuberculin in spite of the BCG vaccination; 6 other children (4.10 per cent) showed doubtful results of similar Mantoux tests; but 100 (68.52 per cent) became clearly hypersensitive to tuberculin. Although the reactivity was so high, clinical and roentgenologic examinations did not demonstrate any evidence of a virulent tuberculosis complicating BCG vaccination. The gastric contents of the principal reactors were injected into guinea pigs, which failed to acquire tuberculosis. The conclusion reached by Arlindo de Assis was that all changes occurring in the primarily nonreacting children, from the point of view of tuberculin hypersensitiveness, should depend on specific effects of the BCG bacilli, which would be absorbed by the gastrointestinal route. This hypersensitiveness decreases progressively.

Among factors which would have influenced such a result were (1) the high viability of the BCG vaccine as prepared in this country, (2) the comparatively high amount of BCG bacilli introduced by mouth and (3) the fasting condition of the children at the time of their vaccination. Dr. Arlindo de Assis concludes that the oral route proved efficient. Occasional examples of specific hyperallergy caused by the oral use of BCG seem to afford definite evidence that a large amount of living bacilli can be absorbed by the gastrointestinal canal.

SWITZERLAND

(From Our Regular Correspondent)

Oct. 25, 1941.

Intoxications with Triorthocresyl Phosphate

Dr. R. Staehelin, professor of internal medicine and director of the medical clinic in Basel, reported to the Basel Medical Society 83 cases of poisoning with triorthocresyl phosphate. He recalled that around 1900 the same type of poisoning had occurred in treating tuberculosis with creosote phosphate. During 1929, 15,000 cases became known following the drinking of adulterated Jamaica ginger. These cases concerned chiefly old persons and some drunkards. The third series of such intoxications which have become known concerned attempts at abortion with apiol. The cases under consideration here were caused by mistaking triorthocresyl phosphate for a food oil in the preparation of cheese bread. In many cases an acute gastroenteritis developed one hour after eating; in a few cases protein was detected in the urine. After a short time the patients felt well again; after a latent period of from fourteen to twenty days however, 78 of the 83 patients had muscular pains and paralysis of the motor nerves, the peripheral groups of the arms and legs being most severely involved. In the later course, fibrillar twitching in the thighs and calves, prolonged erections, profuse sweating, headaches, insomnia, loss of hair and signs of incontinence were seen occasionally. All reflexes, with the exception of the achilles tendon reflex, were intact; the musculature of the abdomen and back functioned properly. Claw hand was observed. The severity of the symptoms was not dependent on the amount of the poison. Paralysis of the peroneus resulted in the "rooster step" walk. The internal organs were free from changes, except that there was an occasional increase in diastase values. All symptoms regressed. The treatment consisted chiefly in the administration of thiamine hydrochloride. The result was always the same, even in the patients who were treated with thiamine hydrochloride and strychnine (9 mg.). None of the patients died. Microscopic examination of the nerves revealed degeneration of the myelin sheaths (lipoid solubility); degeneration of the anterior horn was observed only in severe cases. Ophthalmologic examination disclosed that the visual disturbances, which developed in about one third of the cases, were chiefly the result of disturbances in accommodation and of the contraction of the vessels of the fundus oculi.

In the discussion that followed, it was brought out that the muscle groups which are most taxed during physical work (legs, right hand) were most severely involved in the poisoning.

Deaths

Dr. Adolpho Lutz, a descendant of an old Berne family, died in Rio de Janeiro. He was active in the field of tropical medicine and medical zoology and made special investigations on the transmission of tropical infectious diseases through insects. The Brazilian state of São Paulo recently founded in his honor the Adolpho Lutz Institute. Rio de Janeiro will found a museum of natural history which will bear his name.

Prof. Hermann Matti, appointed in 1938 as professor of surgery and director of the surgical clinic of the University of Berne, succeeding de Quervain, died aged 62 years. Matti successfully continued the illustrious tradition of Kocher and de Quervain, but in the spring of this year was obliged to retire because of ill health. Matti wrote a widely used textbook on fractures.

Deaths

William Hemphill Bell ✠ Medical Director, Rear Admiral, United States Navy, retired, Chevy Chase, Md.; University of Pennsylvania Department of Medicine, Philadelphia, 1897; was appointed an assistant surgeon in the navy in 1898; was advanced through the various grades of the service; retired Jan. 1, 1936 on his own application with the rank of rear admiral; was head of the division of preventive medicine in the bureau of medicine and surgery; delegate to the second session of lectures of the International Bureau of Documentation on Military Medicine, Liége, Belgium, in 1932; first editor of the *U. S. Navy Medical Bulletin*, when it was established in 1907; member of the House of Delegates of the American Medical Association in 1907; fellow of the American College of Surgeons; aged 68; died, November 11, of cerebral arteriosclerosis and hypostatic pneumonia.

Albert Wynne Harris ✠ Nashville, Tenn.; Vanderbilt University School of Medicine, Nashville, 1901; associate professor of neurology at his alma mater from 1909 to 1925, associate professor of clinical neurology and psychiatry from 1925 to 1927 and since 1927 professor of clinical neurology and psychiatry; was president of the Nashville Academy of Medicine; served with the Vanderbilt unit in France during the World War; member of the Southern Psychiatric Association; aged 63; died, December 7, of heart disease.

Andrew Porter Brown, Salina, Kan.; University of Kansas School of Medicine, Kansas City, 1932; member of the Kansas Medical Society; aged 32; first lieutenant in the medical reserve corps of the U. S. Army, serving as a flight surgeon at the Air Corps Gunnery School at Panama City, Fla., where he died, November 4, of infantile paralysis.

William Fero Cannon, Fayetteville, Tenn.; University of Nashville (Tenn.) Medical Department, 1892; Vanderbilt University School of Medicine, Nashville, 1892; member of the Tennessee State Medical Association; past president of the Lincoln County Medical Society; aged 72; died in November of injuries received in a fall.

Anthony Simon Maciejewski, Newark, N. J.; Temple University School of Medicine, Philadelphia, 1916; member of the Medical Society of New Jersey; served during the World War; assistant police surgeon; on the staff of St. James Hospital; aged 55; died, November 7, of carcinoma and cirrhosis of the liver.

Franklin W. Sol Raiter, Cloquet, Minn.; Milwaukee Medical College, 1911; member of the Minnesota State Medical Association; served during the World War; part owner of a hospital bearing his name; aged 52; died, October 2, of cerebral hemorrhage and hypertensive cardiovascular disease.

Samuel L. Carson, Vincennes, Ind.; Hospital College of Medicine, Louisville, Ky., 1898; member of the Indiana State Medical Association; formerly county coroner; aged 74; died, November 10, in the Presbyterian Hospital, Denver, of hypertrophy of the prostate and auricular fibrillation.

Archibald Buchanan, Troy, N. Y.; Albany Medical College, 1895; member of the Medical Society of the State of New York; for many years county coroner; served during the World War; aged 75; died, November 16, of coronary sclerosis and generalized arteriosclerosis.

William F. Chenoweth, Nogales, Ariz.; Medical College of Ohio, Cincinnati, 1888; past president of the state board of medical examiners; member of the Arizona State Medical Association; aged 76; died, August 20, in Santa Barbara, Calif., of carcinoma of the right lung.

Maurice Joseph Lippman ✠ New York; University and Bellevue Hospital Medical College, New York, 1907; assistant, allergy clinic, New York Post-Graduate Medical School; aged 56; died, October 31, in the Beth Israel Hospital of hemangiosarcoma with metastasis.

Benjamin Cyrus Bell, Santa Monica, Calif.; University of Toronto Faculty of Medicine, Toronto, Ont., Canada, 1898; fellow of the American College of Surgeons; aged 71; died, September 3, of cerebral hemorrhage, arteriosclerosis and chronic myocarditis.

George S. Henderson ✠ Holcomb, Ill.; College of Physicians and Surgeons of Chicago, 1895; past president of the Ogle County Medical Society; aged 77; died, November 4, in the Swedish American Hospital, Rockford, of coronary thrombosis.

Arthur Paul Maloney, Fonda, Iowa; John A. Creighton Medical College, Omaha, 1910; member of the Iowa State Medical Society; past president and secretary of the Pocahontas County Medical Society; aged 59; died, October 24, of uremia.

Joseph C. Kugler, Jackson, Mich.; Medical College of Ohio, Cincinnati, 1886; member of the Michigan State Medical Society and the American College of Radiology; aged 79; died, November 23, in the W. A. Foote Memorial Hospital.

George Washington Duncan ✠ Iberia, Mo.; Washington University School of Medicine, St. Louis, 1908; past president of the Miller County Medical Society; aged 62; died, November 3, in St. Mary's Hospital, Jefferson City, of pneumonia.

William Max Fearon ✠ Los Angeles; College of Physicians and Surgeons, Los Angeles, 1913; served during the World War; aged 52; died, November 11, in the Methodist Hospital of Southern California of coronary thrombosis.

Arthur Clinton McKenney, Los Gatos, Calif.; College of Physicians and Surgeons of San Francisco, 1908; formerly assistant clinical professor of medicine at the Stanford University School of Medicine; aged 71; died, October 4.

John George Frederick Holston ✠ Zanesville, Ohio; Jefferson Medical College of Philadelphia, 1903; president of the Muskingum County Academy of Medicine in 1927; aged 62; died, November 2, of myocardial degeneration.

Anton Otto Frana, Chicago; Jenner Medical College, Chicago, 1917; member of the Illinois State Medical Society; served during the World War; on the courtesy staff of the Evangelical Hospital; aged 56; died, November 18.

Wallace Longfellow Meyers, Livermore, Calif.; University of California Medical School, San Francisco, 1909; aged 60; died, August 12, in the Lane Hospital, unit of Stanford University, San Francisco, of nontropical sprue.

Eli George Davis, Lewistown, Ill.; Kentucky School of Medicine, Louisville, 1881; member of the Illinois State Medical Society; aged 88; died, November 11, in the Graham Hospital, Canton, of hypostatic pneumonia.

William John Reed, Los Angeles; University of Southern California College of Medicine, Los Angeles, 1906; aged 66; died, October 10, in the Queen of Angels Hospital of coronary occlusion and essential hypertension.

James Carson Fountain, Columbus, Ohio; Starling Medical College, Columbus, 1906; served during the World War; on the staff of the White Cross Hospital; aged 63; died, November 3, of heart disease.

Robert Mayrand, Quebec, Que., Canada; Laval University Faculty of Medicine, Quebec, 1901; served during the World War; formerly professor of dermatology at his alma mater; aged 64; died, October 7.

Moss Young Allen, Mount Airy, N. C.; Medical Department of Tulane University of Louisiana, New Orleans, 1898; aged 68; died, October 31, at the Martin Memorial Hospital of cerebral hemorrhage.

Tandy Allen Hughes, Denver; St. Louis Medical College, 1883; at one time secretary-treasurer of the state board of medical examiners; aged 81; died, November 2, in St. Joseph's Hospital of pneumonia.

William Henry Garrison, Clarkesville, Ga.; Atlanta School of Medicine, 1909; member of the Medical Association of Georgia; aged 57; died, November 10, in the Downey Hospital, Gainesville.

Charles Leidy Bossert ✠ Atlantic City, N. J.; Hahnemann Medical College and Hospital of Philadelphia, 1908; served during the World War; aged 68; died, November 13, of heart disease.

John Reid Edwards, Madison, Wis.; Medical College of Virginia, Richmond, 1940; resident, State of Wisconsin General Hospital; aged 25; was killed in November in an automobile accident.

Artemas W. Chase ✠ Adrian, Mich.; Detroit College of Medicine, 1900; formerly mayor; served during the World War; on the staff of the Bixby Hospital; aged 66; died, November 7.

Frank W. Lee ✠ Osage, Iowa; State University of Iowa College of Homeopathic Medicine, Iowa City, 1887; aged 82; died, October 28, in the Cedar Valley Hospital, Charles City, of uremia.

James L. Bow, Whitewright, Texas; Louisville (Ky.) Medical College, 1893; member of the State Medical Association of Texas; aged 76; died, November 4, at Wichita Falls.

William Erastus Judson, Livermore, Calif.; University of Minnesota College of Medicine and Surgery, Minneapolis, 1907; aged 63; died, August 10, in Oakland of uremia.

Shelton Idolia Colvin, Gibsland, La.; Memphis (Tenn.) Hospital Medical College, 1891; aged 73; died, September 5, of injuries received when he was struck by a truck.

Elzora Butler Allen, Raymond, Calif.; Woman's Medical College of Pennsylvania, Philadelphia, 1904; aged 67; died in September in a hospital at Madera of carcinoma.

Leon Octave Noel, Sherbrooke, Que., Canada; Laval University Faculty of Medicine, Quebec, 1883; aged 82; died, October 15, in the Hopital Notre-Dame, Montreal.

Frank P. Head, Gallatin, Tenn.; Vanderbilt University School of Medicine, Nashville, 1898; aged 65; died, November 4, of cerebral hemorrhage and arteriosclerosis.

Edward Ferris Holbrook, San Francisco; Cooper Medical College, San Francisco, 1893; member of the California Medical Association; aged 69; died, October 9.

John H. Lowery, San Diego, Calif.; University of Louisville (Ky.) Medical Department, 1894; aged 68; died, October 3, of diabetes mellitus and arteriosclerosis.

Joseph Domenic Reeng, San Francisco; Cooper Medical College, San Francisco, 1909; member of the California Medical Association; aged 54; died, October 28.

Joseph Ridgway, Minneapolis; Minneapolis College of Physicians and Surgeons, 1894; died, October 29, of arteriosclerosis and myocardial insufficiency.

Allister McDonald Murray, Toronto, Ont., Canada; University of Toronto Faculty of Medicine, 1908; died, October 29, in the Toronto East General Hospital.

Lawrence Hobbs Acres, Los Angeles; Stanford University School of Medicine, San Francisco, 1930; aged 38; died, August 21, of upper respiratory infection.

William Clarence Doyle, Windsor, Ont., Canada; Western University Faculty of Medicine, London, 1901; at one time mayor of Essex; died, September 17.

Melvin McKinley Lofton ✠ Philadelphia; Howard University College of Medicine, Washington, D. C., 1922; aged 44; died, October 7, of heart disease.

Morris Fink ✠ New York; Columbia University College of Physicians and Surgeons, New York, 1906; aged 59; died, October 31, of coronary thrombosis.

Wendell H. Priest, Mitchell, Neb.; John A. Creighton Medical College, Omaha, 1910; aged 58; died, October 26, in the Fairacres Hospital, Scottsbluff.

William Moore White, Lenoir, N. C.; Atlanta (Ga.) College of Physicians and Surgeons, 1899; formerly county health officer; aged 80; died, October 31.

Joseph Walter Kean, Los Angeles; Jefferson Medical College of Philadelphia, 1906; aged 57; died, August 30, of coronary occlusion and arteriosclerosis.

Albert C. Buell, Cleveland; Homeopathic Hospital College, Cleveland, 1880; aged 90; died, November 10, of bronchopneumonia and coronary sclerosis.

Alonzo Graves, Russellville, Ala.; Marion-Sims College of Medicine, St. Louis, 1899; veteran of the Spanish-American War; aged 67; died in October.

William Wright McEwen, San Diego, Calif.; St. Louis College of Physicians and Surgeons, 1883; aged 87; died, September 4, of coronary occlusion.

John Riley Hughes ✠ Milwaukee; Rush Medical College, Chicago, 1912; served during the World War; aged 55; died, October 26, in Oakland, Calif.

Epaenetus Luther Trimmer ✠ Los Angeles; Jefferson Medical College of Philadelphia, 1897; aged 78; died, August 13, of aortic regurgitation.

Archie E. Carder, Coweta, Okla.; Beaumont Hospital Medical College, St. Louis, 1901; aged 77; died, October 30, of carcinoma of the prostate.

Norman Beard Noll, Mercer, Pa.; Jefferson Medical College of Philadelphia, 1902; aged 63; died, October 29, in New York of cerebral hemorrhage.

Carl S. Gunther Nagel, San Francisco; Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin, Prussia, 1881; aged 83; died, October 27.

Alexander Franklin Brown, Fort Sumner, N. M.; Vanderbilt University School of Medicine, Nashville, Tenn., 1890; aged 82; died, October 8.

John Rollin Harrison, La Porte, Texas; College of Physicians and Surgeons, Keokuk, Iowa, 1892; aged 83; died, November 5, in Houston.

Will Sayer Moffatt, Los Angeles; Hahnemann Medical College and Hospital, Chicago, 1868; aged 94; died, September 12, of arteriosclerosis.

Harvey Milton Mayer, Los Angeles; Medico-Chirurgical College of Kansas City, Mo., 1905; aged 67; died, August 17, of ventricular fibrillation.

William Silas Hewitt, Cincinnati; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1895; aged 72; died, November 9.

Moses Krakowski ✠ New York; University of Kharkov Faculty of Medicine, Russia, 1894; aged 74; died, October 31, of coronary occlusion.

Hammond Johnson McCallum, Azusa, Calif.; University of California Medical Department, San Francisco, 1895; aged 71; died, October 15.

Madeline E. Johns, San Francisco; University of California Medical Department, San Francisco, 1903; aged 72; died, September 10.

Matthew Francis Desmond, Burney, Calif.; University of California Medical School, San Francisco, 1923; aged 47; died, August 10.

Robert Lee Fulcher, Blanco, Texas; University of Tennessee Medical Department, Nashville, Tenn., 1897; aged 72; died, October 1.

Gordon Edward Helston, Toronto, Ont., Canada; University of Toronto Faculty of Medicine, 1922; aged 41; died, October 14.

John William Haines, Croton, Ohio; Starling Medical College, Columbus, 1896; aged 70; died, November 4, of myocarditis.

William S. Ambler, Philadelphia; Hahnemann Medical College and Hospital of Philadelphia, 1893; aged 79; died, October 15.

Richard C. Cartwright, Kingston, Ont., Canada; Queen's University Faculty of Medicine, Kingston, 1884; aged 79; died, October 20.

Edgar Moses Brundage, Chaplin, Sask., Canada; Baltimore Medical College, 1896; also a dentist; aged 79; died, October 2.

Richard A. Stark, Chicago; Jenner Medical College, Chicago, 1908; served during the World War; aged 55; died in October.

Frank Webster Terwilliger, Highland, N. Y.; Dartmouth Medical School, Hanover, N. H., 1896; aged 71; died, October 31.

Owen Abner Buck Ames, Fairfield, Maine; Dartmouth Medical School, Hanover, N. H., 1898; aged 65; died, November 9.

William Axel Johnson, Santa Cruz, Calif.; Chicago College of Medicine and Surgery, 1916; aged 70; died, August 31.

James Albert Ghent, San Francisco; Trinity Medical College, Toronto, Ont., Canada, 1889; aged 72; died, September 1.

Charles Wilbur Monroe ✠ Cincinnati; University of Cincinnati College of Medicine, 1934; aged 40; died, November 4.

Joseph Franklin De Castro, Brooklyn; Bellevue Hospital Medical College, New York, 1885; aged 81; died, November 2.

Melvin Clinton Kimball Sr., Tulsa, Okla.; American Medical College, St. Louis, 1908; aged 61; died, November 2.

James Edward McCue, San Francisco; Cooper Medical College, San Francisco, 1901; aged 73; died, October 30.

Henry Edgar Vreeland, Los Angeles; Rush Medical College, Chicago, 1891; aged 86; died, October 24, of senility.

Paul Heron Reilly ✠ Vallejo, Calif.; Cooper Medical College, San Francisco, 1901; aged 77; died in October.

Joseph Crane Kessler, Hamlin, W. Va.; Illinois Medical College, Chicago, 1908; aged 67; died, October 28.

William Lustig, New York; Long Island College Hospital, Brooklyn, 1906; aged 57; died, October 29.

James P. Atkinson, Bodcaw, Ark. (licensed in Arkansas in 1903); aged 80; died, October 11, of carcinoma.

Charles Henry Buchanan, Chicago; Rush Medical College, Chicago, 1876; aged 90; died, November 12.

Bureau of Investigation

EDWARD S. HIDDEN AND SOME FAKES

"Tonic," Obesity "Cure" and Hair "Grower" Subjects of Federal Actions

Edward S. Hidden of New York first came to the attention of the Bureau of Investigation in March 1939 as a shipper of a nostrum, "Vitatonic," which was seized in interstate commerce by the Food and Drug Administration. The shipment was found to be a violation of the national Food and Drugs Act because of false and fraudulent representations on the labels. Among these were that the product was a "body builder . . . wonderfully efficient for rundown people . . . will tone up your entire system by bringing about the proper coordination of your stomach, liver, kidneys and bowels and by supplying your body with the necessary essentials it now lacks. . . ." Government chemists reported that Vitatonic consisted essentially of extracts of plant drugs including nux vomica and an emodin-bearing drug (not named), with alcohol (14.4 per cent by volume) and water. As no claimant appeared, judgment of condemnation was entered and the product ordered destroyed. The resulting Notice of Judgment (No. 29764) was briefly abstracted in THE JOURNAL, Dec. 9, 1939, page 2168.

Following the confiscation an information detailing the nature of the violation was directed against Edward S. Hidden and the case was transmitted to the United States Attorney General for consideration. Subsequently at the trial in New York City in September 1940 a jury found Hidden guilty on three counts and he was fined $600, from which verdict he filed an appeal, it was reported. The judge's charge to the jury was said to have been particularly strong. It was reported also that Hidden had been convicted in New York of violating the sanitary code for having in his possession and for sale an unregistered "patent medicine" and a harmful drug; that he was sentenced to six months imprisonment and served two and a half months of this sentence before being released on bail after filing an appeal, which is said to be still pending.

The Post Office Department was the next government agency to look into one of Hidden's schemes. This was the mail order sale of a "fat cure," variously known as "Slim-A-Lax" and "Tab Thins" and represented to reduce excess weight safely, quickly and easily without diet or exercise and regardless of the cause of the obesity. According to a government chemist, it consisted of pink-coated tablets, each essentially a mixture of ginger, podophyllin, aloin, cascara and small amounts of strychnine and belladonna. As an expert medical witness for the government pointed out, its effect was a laxative one. In other words, it was one of the pernicious treatments that reduce weight by hurrying the food through the system before it can be assimilated. Further, it was shown that Hidden's nostrum was not "absolutely safe and harmless" as claimed. He presented no defense either in person or through any representative, and a fraud order was issued on Oct. 25, 1940 against the names under which he had operated the scheme: Madison Chemical Company, Tab Thins Company, Slim-A-Lax Company, Riverside Chemical Company and C. N. Talcott.

Meantime the Post Office had been investigating another mail order activity of Edward S. Hidden. This was an alleged baldness cure called "Nuhair," in the sale of which he did business under his own name, also as C. J. Walton, Nuhair Company and Nu Hair Company. The Post Office charged that Hidden represented that Nuhair was a scientific discovery, that when used as directed it would produce a full growth of hair even when the user was "as bald as a billiard ball" and that it would overcome various scalp disorders. The usual testimonials, of course, were employed as part of the promotional scheme. At the hearing of the case it was brought out that, according to the Nuhair label, the product contained water, sulfonated castor oil, kerosene, 60 per cent of alcohol and 0.1 per cent of beta naphthol, and a government chemist's analysis confirmed this composition. An expert medical witness for the government testified that the ingredients of Nuhair are not new but have been commonly used in hair treatments and their actions and limitations are well known; that baldness may be due to many systemic causes not affected by any type of treatment, and that Nuhair was worthless as a hair grower. On Jan. 28, 1941 a fraud order was issued which debarred from the mails the business conducted by Edward S. Hidden, C. J. Walton, the Nuhair Co., Nu Hair Company, and their officers and agents, none of whom had appeared or put up a defense at the hearing of the case.

STIPULATIONS

Agreements Between Federal Trade Commission and Promoters of Various Products

The following items are abstracts of stipulations in which promoters of "patent medicines," cosmetics or medical devices have cooperated with the Federal Trade Commission to the extent of agreeing to discontinue certain misrepresentations in their advertising. These stipulations differ from the "Cease and Desist Orders" of the Commission in that such orders definitely direct the discontinuance of misrepresentations. The abstracts that follow are presented primarily to illustrate the effects of the provisions of the Wheeler-Lea Amendment to the Federal Trade Commission Act on the promotion of such products.

Absorbine, Jr.—In March 1941 the Federal Trade Commission accepted from W. F. Young, Inc., Springfield, Mass., a stipulation in which this concern promised to discontinue the following misrepresentations in the sale of its products: That "Absorbine, Jr." can kill such fungi of athlete's foot as are buried beneath the corneous layer of the skin, have any effect on tissues deeper than those supplied by the peripheral vascular system, or that accepted laboratory tests have proved that it achieves such results. Nearly four years previously (June 1937) the Young concern had stipulated with the Federal Trade Commission that it would no longer advertise Absorbine, Jr. as a treatment for insomnia.

Mothersill's Seasick Remedy.—This is put out by a Ferd. T. Hopkins, trading as Ferd. T. Hopkins and Son, New York. In March 1941 he signed a stipulation with the Federal Trade Commission in which he agreed to cease advertising that the product will prevent or stop travel sickness or assure travel comfort. When analyzed in the American Medical Association's Chemical Laboratory a good many years ago, the treatment was found to consist of capsules whose chief potent ingredient was chlorobutanol.

Rumagol.—This is put out by one A. Medrano, Los Angeles, trading as the Rumagol Laboratories, Rio Grande Pharmacy and Rio Grande Drug Company. In March 1941 Medrano entered into a stipulation with the Federal Trade Commission in which he promised to cease making these misrepresentations for "Rumagol": That it is an effective treatment or analgesic for rheumatoid arthritis, muscular pains, lumbago, sciatica, gout, neuritis, arteriosclerosis, painful or twisted joints or nerves or so-called rheumatism, that competing products are ineffective in the treatment of such ailments or that the preparation will reduce and eliminate excess uric acid by its action on the kidneys. Medrano further agreed to discontinue advertisements which fail to reveal that Rumagol should not be used when abdominal pain, nausea, vomiting or other symptoms of appendicitis are present or that frequent or continued use of the product may result in dependence on laxatives.

Schenck's (Dr.) Mandrake Pills.—J. H. Schenck and Son, Inc., Philadelphia, promised the Federal Trade Commission in March 1941 that it would discontinue advertisements which fail to reveal that these pills should not be used when abdominal pain or other symptoms of appendicitis are present or that frequent or continued use of the product may result in dependence on laxatives.

Thymo Borine.—In March 1941 the Thymo Borine Laboratory, Milwaukee, stipulated with the Federal Trade Commission that it would no longer advertise that this alleged mouth wash, deodorant and antiseptic purifies the breath, mitigates inflammation of the mouth resulting from artificial teeth and stops perspiration odors or foot odors; that it is a competent treatment for itching scalp or itching skin due to bites, poisons, hives or athlete's foot and is an effective germicide when used as a gargle.

Vimm Products.—Mariano Pollina of New York for a time operated as Vimm Wheat Germ Products Company and Molerno Company, distributing alleged health food products. In March 1941 he signed a stipulation with the Federal Trade Commission stating, among other things, that he had sold his interest in the two trade names and the food products to a corporation. He agreed that, should he ever resume the advertising and sale of these products, he would not in any way represent that "Vimm's Wheat Germ Oil Capsules" will assure good health or normalize, strengthen, revive or prolong reproductive functions; that "Vimm's Whole Wheat Germ" is the world's richest natural source of vitamins B, E and G, a good source of vitamins A and C and is concentrated with iron, copper, potassium, magnesium and manganese or any of these elements; that "Fortified Palm-Co" will prevent tooth decay, premature aging, nervousness or acidity and is essential for growing children and pregnant women, or that "Plain Palm-Co" assures digestive vigor, is a perfect natural food containing the greatest possible concentration of vital health-forming elements in digestible form.

Correspondence

SURGICAL VS. MEDICAL TREATMENT OF HYPERTENSION

To the Editor:- The paper by Woods and Peet (THE JOURNAL, November 1, p. 1508) needs careful study and perhaps additional comment in order to emphasize certain points. The important question is whether or not to recommend surgical treatment for patients with hypertension. Both in their own series and in the series of Wagener and Keith from the Mayo Clinic which they use for comparison, the percentage of cases classified as group 4 (malignant hypertension) is much higher than that found in private practice. Their own series is stated to be 32 per cent and the Mayo group 67 per cent. To a great extent, therefore, they are not discussing the kind of cases that comprise most of the cases of hypertension seen in private practice.

The majority of patients with hypertension seen in private practice have a moderately high blood pressure and a moderate degree of arteriosclerosis of the retinal vessels and would fall into their group 2. One must be particularly impressed, therefore, that their surgical results in this group are the same as the medical results as far as mortality is concerned.

From a practical point of view, then, the survival of patients with the most common form of hypertension with which the practitioner deals is not influenced by this form of surgical treatment.

In their group 3 it seems questionable whether they are talking about the same kind of patients as those in the Mayo series. They do not attempt to differentiate between patients who have arteriosclerosis of the retinal vessels and those who have simply angiospasm, and yet it is obvious that this is an important difference as far as end results of any treatment is concerned. Moreover, in the revision of the classification which they offer they do not attempt any differentiation within this group as far as arteriosclerosis and angiospasm are concerned. When a patient with hypertension has arteriosclerosis of the retinal vessels, especially if it is pronounced, it is an indication of long-standing hypertension with probable changes in vital organs due to corresponding arteriosclerotic changes.

Therefore, one may question whether the comparability of group 3 has been established for the two series of cases. This in turn affects the evaluation of mortality. Moreover, when one compares their table 4 B, which has to do with mortality, with table 1, one finds that in this same group 3 the Mayo Clinic had a percentage of only 17 females while they had 43, and it is well recognized that women tolerate hypertension better than men.

It is their group 4 (cases of papilledema) in which noteworthy therapeutic results seem to have been achieved. If their cases in this group correspond to the Mayo group 4 and do not include cases of acute angiospastic hypertension, which sometimes subside spontaneously, then surgery of at least this form of hypertension is amply justified.

The last point is one to which I have called attention before, and that is the fallacy of judging symptomatic relief following operation as a criterion to justify operation, when blood pressure figures and other objective evidences have not been influenced. It is obvious that this is no criterion at all and by no means constitutes an indication of the value of surgery as opposed to medicine. Many therapeutic procedures besides surgery may bring about symptomatic relief in hypertensive patients.

May I offer the following classification of retinal changes from the standpoint of judging therapeutic results, if that is to be the only criterion:

1. Normal.
2. Arteriosclerosis without angiospasm.
3. Angiospasm without arteriosclerosis.
4. Both arteriosclerosis and angiospasm
   (*a*) with no evidence of active retinitis and
   (*b*) with evidence of active retinitis (hemorrhages and exudates).
5. Arteriosclerosis, angiospasm, retinitis and papilledema.

This is the first thorough effort of which I know to compare results of medical and surgical treatment by a long time follow-up of a number of carefully studied cases and for that reason deserves a great deal of credit.

EDWARD WEISS, M.D., Philadelphia.

[NOTE.—The letter of Dr. Weiss was referred to Dr. Max Peet, whose reply follows:]

To the Editor:—May we first express our appreciation to Dr. Weiss for the keen interest he has shown in our paper and for his penetrating criticisms, indicating a thorough knowledge of the therapeutics of hypertension.

The question is not at all a matter of "surgical versus medical treatment of hypertension" but rather of determining the point in the progress of the disease when surgical treatment should be called on to replace accepted medical treatment which has failed. In confirmation of this point of view may we agree with the author that we do not see "the kinds of patients who comprise most of the cases seen in private practice" but instead are asked to treat those patients who have not gained relief after a thorough trial of medical treatment. The term "versus" arises only when persistent medical therapy has proved inadequate for too long and has allowed irreversible damage to occur to the patient. It should be pointed out that to expect the neurologic surgeon to relieve the hypertension in such a case is exactly the same as to ask the general surgeon to operate on a patient whose appendix has been allowed to rupture.

In order to obviate the criticism that our cases in group 3 were not the same type as those in the Mayo series we have, in our article, presented a careful analysis of these cases and have, in addition, had assurance from Dr. Keith that they were correctly placed in group 3. We feel, therefore, that this criticism is unjustified.

To proceed to the next point of criticism, our statistics with regard to the difference in mortality between the sexes are misquoted. The correct figures for group 3 are: In table 1 (number and sex of patients) the percentage of males in the Mayo series is 58, in our series 33⅓; the percentage of females in the control series is 42, in ours 66⅔. (The figures quoted by the author of the letter are for total percentages, not for each sex). Regardless of this error, the argument that the two series are not comparable because we include more females is still tenable, provided the statement is true that "it is well recognized that women tolerate hypertension better than men." In anticipation of this criticism we have pointed out in our original article that "careful analysis of table 4 B demonstrates a relatively small difference in mortality between the two sexes in the control group." Actual figures for group 3 show no difference in mortality, revealing a 91 per cent mortality for males and a 93 per cent mortality for females in the control series as against a 36 per cent male and a 36 per cent female mortality in our series. The conclusion, therefore, should be reached that the idea that women in this group tolerate hypertension better than males must be revised and, for that reason, it must also be concluded that our mortality statistics can accurately be compared with those of the control series.

We should like to assure the author that our group 4, as stated in our article, includes only, by definition, those patients with papilledema. Patients with "acute angiospastic hypertension" without papilledema were not included in group 4.

We must disagree with the statement that symptomatic relief following operation "is no criterion at all." Although we state in our paper that "we have not emphasized symptomatic relief following operation," and we fully realize the difficulty in evaluating such relief after therapy, still to us the large percentage of patients (approximately 85) who did gain benefit symptomatically is of definite significance. This significance becomes greater when it is realized that the majority of these patients came because of symptoms which were unrelieved by accepted medical treatment.

The suggested classification of retinal changes is a good one. We shall not discuss its merits and shortcomings here, since we have a paper about to be published in which we discuss the great need for a standardized method of pretherapeutic classification and post-therapeutic evaluation of results and include a newly proposed classification of the retinal changes in hypertension which incorporates the modifications suggested in the letter.

MAX M. PEET, M.D.
WARD W. WOODS, M.D.
Ann Arbor, Mich.

ON THE ENZYMATIC HYPOTHESIS OF RADIOSENSITIVITY

To the Editor:—An editorial comment (THE JOURNAL, September 20, p. 1020) discussed some observations by W. M. Dale: The Effect of X-Rays on Enzymes, *Biochem. J.* **34**:1367 [Nov.] 1940) on the roentgen inactivation of purified enzymes in dilute solution. Under these conditions a large fraction of the activity of the specimen could be destroyed by doses of radiation even smaller than those used in radiotherapy.

The hypothesis that cellular damage produced by roentgen rays may be a consequence of the inactivation of intracellular enzymes has recently been regarded as untenable because of the enormous doses required for inactivation in experiments with crude concentrated enzyme preparations. The results of Dale with purified enzymes have again brought forth the suggestion that enzyme destruction in cells may after all play a part in determining the sensitivities of different tissues to roentgen rays.

In this connection it is interesting to consider some observations by us (Luria, S. E., and Exner, F. M.: The Inactivation of Bacteriophages by X-Rays: Influence of the Medium, *Proc. Nat. Acad. Sc.* **27**:370 [Aug.] 1941) on the roentgen inactivation of bacteriophages suspended in different mediums. These observations suggest an explanation of Dale's results, but at the same time they bring renewed doubt as to whether enzyme inactivation by roentgen rays can take place in living cells to an appreciable extent.

In the action of roentgen rays on bacteriophages, two distinct mechanisms were found and were interpreted one as an indirect and the other as a direct effect of the radiation. In dilute water and saline suspensions relatively small doses of radiation inactivate large amounts of bacteriophage. This effect appears to be due to an inactivating agent produced by roentgen rays in the medium. Among other reasons for this interpretation is the fact that the effect depends on the composition of the medium. The presence of small amounts of foreign proteins (suspensions in broth or in water solutions of gelatin, albumin and the like) greatly increase the resistance of bacteriophages. The presence of foreign proteins protects the bacteriophage presumably by competing with it in reacting with the agent produced in the medium by roentgen rays. A mere screening effect can be excluded on the basis of the known mechanism of roentgen absorption.

With large doses of roentgen rays—far larger than any used in therapy—bacteriophage is inactivated even in the presence of proteins. The characteristics of this inactivation process, in contrast with those of the effect in water or saline solution, indicate that it is a direct effect of the radiation on the bacteriophage particles.

There is published evidence that at least some other viruses in their sensitivity to roentgen rays follow a pattern similar to that observed with bacteriophages (Syverton, J. T.; Berry, G. P., and Warren, S. L.: The Roentgen Irradiation of Papilloma Virus (Shope): II. The Effect of X-Rays upon Papilloma Virus in Vitro, *J. Exper. Med.* **74**:223 [Sept.] 1941. Friedewald, W. F., and Anderson, R. S.: Influence of Extraneous Protein and Virus Concentration on the Inactivation of the Rabbit Papilloma Virus by X-rays, *ibid.* **74**:463 [Nov.] 1941).

The inactivation of enzymes in pure and in crude preparations can easily be interpreted in terms of the behavior of viruses as just outlined. The action of roentgen rays on enzymes in pure preparations, as observed by Dale, is doubtless an indirect effect, as indicated by its dependence on concentration. Earlier observations (Hussey, R. G., and Thompson, W. R.: The Effect of Radioactive Radiation and X-Rays on Enzymes: I. The Effect of Radiation from Radium Emanations on Solutions of Trypsin, *J. Gen. Physiol.* **5**:647 [May] 1923. Clark, H., and Northrop, J. H.: The Inactivation of Trypsin by X-Rays, *ibid.* **9**:87 [Sept.] 1925) on trypsin can readily be accounted for by the same mechanism. Moreover, the high resistance of the proteolytic enzymes studied by Dale, when acting on their substrates, may easily be interpreted as due to the protecting action of proteins.

Though it may seem paradoxic, the more a virus or an enzyme is purified the more the direct effect of radiation is overshadowed by the indirect and the more radiosensitive the material appears to be. In the case of enzymes, it is unlikely that a direct effect of radiation has ever been observed. If existing, it would probably become observable only with doses of several million roentgens, on account of the small molecular size of enzymes.

In view of the evidence presented here, it is difficult to accept the indirect action of roentgen rays on enzymes, as observed by Dale with purified material, as an explanation of the radiosensitivity of cells. As pointed out by Friedewald and Anderson in another connection, protoplasmic fluid, being rich in protein, would be expected to protect enzymes from the inactivating agent produced in water by roentgen rays. Only through some other process as yet unrecognized could enzymes in tissues be inactivated by therapeutic doses of roentgen rays.

S. E. LURIA, M.D.
FRANK M. EXNER, M.A.
New York.

PHONOGRAPHIC RECORDS OF HEART SOUNDS

To the Editor:—My attention has been called to an editorial comment in THE JOURNAL, October 18, which speaks of Dr. Geckeler's reproductions of heart sounds on phonographic records. You make the statement that he "no doubt conceived the technic." I thought that you might be interested in knowing that we have on file at the Army Medical Museum records of heart sounds prepared and deposited with us by Dr. Benjamin Manchester of Washington, D. C., in 1939. I understand that Dr. Geckeler knew of these records.

J. E. ASH, Colonel, Medical Corps, U. S. Army;
Curator, Army Medical Museum, Washington, D. C.

Medical Examinations and Licensure

COMING EXAMINATIONS AND MEETINGS

ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE

CHICAGO, Feb. 16-17, 1942. Council on Medical Education and Hospitals, Sec., Dr. William D. Cutter, 535 North Dearborn Street, Chicago.

MEDICAL CORPS, UNITED STATES NAVY

Examination. Assistant Surgeon with the permanent rank of Lieutenant (junior grade) and Acting Assistant Surgeon with the probationary rank of Lieutenant (junior grade), Jan. 5-9. Examination will be held at the Naval Hospitals at Chelsea, Mass., Newport, R. I., Brooklyn, Philadelphia, Norfolk, Va., Charleston, S. C., Pensacola, Fla., Corpus Christi, Tex., San Diego and Mare Island, Calif., Puget Sound, Wash., Great Lakes, Ill., Pearl Harbor, T. H., and Naval Medical Center, Washington, D. C. Apply Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

NATIONAL BOARD OF MEDICAL EXAMINERS EXAMINING BOARDS IN SPECIALTIES

Examinations of the National Board of Medical Examiners and Examining Boards in Specialties were published in THE JOURNAL, December 13, page 2096.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: Montgomery, June 16-18. Sec., Dr. B. F. Austin, 519 Dexter Ave., Montgomery.

ARIZONA: * Phoenix, Jan. 6-7. Sec., Dr. J. H. Patterson, 826 Security Bldg., Phoenix.

COLORADO: * *Endorsement.* Denver, Jan. 6. *Examination.* Denver, Jan. 7-9. Applications must be on file not later than Dec. 22. Sec., Dr. George R. Buck, 831 Republic Bldg., Denver.

CONNECTICUT: * *Medical Examination.* Hartford, March 10-11. *Endorsement.* Hartford, March 24. Sec. to the Board, Dr. Creighton Barker, 258 Church St., New Haven. *Homeopathic.* Derby, March 10-11. Sec., Dr. Joseph H. Evans, 1488 Chapel St., New Haven.

DELAWARE: Dover, July 14-16. Sec., Medical Council of Delaware, Dr. Joseph S. McDaniel, 229 S. State St., Dover.

FLORIDA: * Jacksonville, June 22-23. Sec., Dr. William M. Rowlett, Box 786, Tampa.

GEORGIA: Atlanta, June. Sec., State Examining Boards, Mr. R. C. Coleman, 111 State Capitol, Atlanta.

HAWAII: Honolulu, Jan. 12-15. Sec., Dr. James A. Morgan, 48 Young Bldg., Honolulu.

IDAHO: Boise, Jan. 13. Dir., Bureau of Occupational License, Mr. Walter Curtis, 355 State Capitol Bldg., Boise.

ILLINOIS: Chicago, Jan. 20-22. Superintendent of Registration, Mr. Philip M. Harman, Department of Registration and Education, Springfield.

INDIANA: Indianapolis, June 16-18. Sec., Board of Registration and Examination, Dr. J. W. Bowers, 301 State House, Indianapolis.

IOWA: * Des Moines, Jan. 15-17. Dir., Division of Licensure and Registration, State Department of Health, Mr. H. W. Grefe, Capitol Bldg., Des Moines.

MAINE: Portland, March 10-11. Sec., Board of Registration of Medicine, Dr. Adam P. Leighton, 192 State St., Portland.

MASSACHUSETTS: Boston, March 10-13. Sec., Board of Registration in Medicine, Dr. Stephen Rushmore, 413-F State House, Boston.

MICHIGAN: * Ann Arbor and Detroit, June 10-12. Sec., Board of Registration in Medicine, Dr. J. Earl McIntyre, 202-4 Hollister Bldg., Lansing.

MINNESOTA: * Minneapolis, Jan. 20-22. Sec., Dr. Julian F. Du Bois, 230 Lowry Medical Arts Bldg., St. Paul.

MISSISSIPPI: *Reciprocity.* Jackson, December. Asst. Sec., State Board of Health, Dr. R. N. Whitfield, Jackson.

MONTANA: Helena, April 7-8. Sec., Dr. Otto G. Klein, First National Bank Bldg., Helena.

NEW HAMPSHIRE: Concord, March 12-13. Sec., Dr. T. P. Burroughs, Board of Registration in Medicine, State House, Concord.

NEW JERSEY: Trenton, June 16-17. Sec., Dr. Earl S. Hallinger, 28 W. State St., Trenton.

NEW MEXICO: * Santa Fe, April 13-14. Sec., Dr. Le Grand Ward 135 Sena Plaza, Santa Fe.

NORTH CAROLINA: *Endorsement.* December. Sec., Dr. W. D. James, Hamlet.

NORTH DAKOTA: Grand Forks, Jan. 6-9. Sec., Dr. G. M. Williamson, 4½ S. Third St., Grand Forks.

OREGON: Portland, Jan. 21-23. Exec. Sec., Miss Lorienne M. Conlee, 608 Failing Bldg., Portland.

PENNSYLVANIA: Philadelphia, Jan. 6-10. Acting Sec., Bureau of Professional Licensing, Mrs. Marguerite G. Steiner, 358 Education Bldg., Harrisburg.

RHODE ISLAND: * Providence, Jan. 8-9. Chief, Division of Examiners, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH DAKOTA: * Pierre, Jan. 13-14. Dir., Medical Licensure, Dr. J. F. D. Cook, State Board of Health, Pierre.

TEXAS: Galveston, March 23-25. Sec., Dr. T. J. Crowe, 918-20 Texas Bank Bldg., Dallas.

VERMONT: Burlington, Feb. 10-12. Sec., Board of Medical Registration, Dr. F. J. Lawliss, Richford.

WISCONSIN: * Madison, Jan. 13-15. Sec., Dr. H. W. Shutter, 425 E. Wisconsin Ave., Milwaukee.

WYOMING: Cheyenne, Feb. 2-3. Sec., Dr. M. C. Keith, Capitol Bldg., Cheyenne.

* Basic Science Certificate required.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

CONNECTICUT: Feb. 14. Address State Board of Healing Arts, 1945 Yale Station, New Haven.

DISTRICT OF COLUMBIA: Washington, April 20-21. Sec., Commission on Licensure, Dr. George C. Ruhland, 6150 E. Municipal Bldg., Washington.

IOWA: Des Moines, Jan. 13. Dir., Division of Licensure and Registration, State Department of Health, Mr. H. W. Grefe, Capitol Bldg., Des Moines.

MICHIGAN: February 13-14. Sec., Miss Flora E. Dube, East Lansing.

MINNESOTA: Minneapolis, Jan. 6-7. Sec., Dr. J. Charnley McKinley, 126 Millard Hall, University of Minnesota, Minneapolis.

NEBRASKA: Omaha, Jan. 13-14. Dir., Bureau of Examining Boards, Mrs. Jeannette Crawford, 1009 State Capitol Bldg., Lincoln.

NEW MEXICO: Albuquerque, Feb. 2. Sec., Miss Pia Joerger, State Capitol, Santa Fe.

OREGON: Portland, Feb. 14. Applications must be on file not later than than Jan. 28. Sec., State Board of Higher Education, Mr. Charles D. Byrne, University of Oregon, Eugene.

RHODE ISLAND: Providence, Feb. 18. Chief, Division of Examiners, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

Michigan June Report

The Michigan State Board of Registration in Medicine reports the written examination for medical licensure held at Ann Arbor and Detroit, June 11-13, 1941. Two hundred and nineteen physicians were examined, all of whom passed. The following schools were represented:

PASSED		
School	Year Grad.	Number Passed
College of Medical Evangelists	(1941, 4)*	4
University of Colorado School of Medicine	(1940)*	1
Yale University School of Medicine	(1940)*	1
Loyola University School of Medicine	(1941, 2)*	2
Northwestern University Medical School	(1941, 5)*	5
Rush Medical College	(1940, 3),* (1941)*	4
University of Chicago, The School of Medicine	(1939),* (1940)*	2
University of Illinois College of Medicine	(1935),* (1941)*	2
Indiana University School of Medicine	(1940)*	1
State University of Iowa College of Medicine	(1940)*	1
Tulane University of Louisiana School of Medicine	(1940)*	1
Harvard Medical School	(1940),* (1941)*	2
University of Michigan Medical School	(1940, 2),* (1941, 113)*	115
Wayne University College of Medicine	(1941, 52),† (1941, 2)*	54
University of Minnesota Medical School	(1941, 4)*	4
St. Louis University School of Medicine	(1941, 2)*	2
Creighton University School of Medicine	(1940), (1940)*	2
Cornell University Medical College	(1940)*	1
Syracuse University College of Medicine	(1940)*	1
University of Buffalo School of Medicine	(1940)*	1
Univ. of Rochester School of Medicine and Dentistry	(1940, 2)*	2
Jefferson Medical College of Philadelphia	(1939)*	1
Univ. of Pennsylvania School of Medicine	(1939, 2),* (1940, 3)*	5
Marquette University School of Medicine	(1941)*	1
University of Wisconsin Medical School	(1940)*	1
McGill University Faculty of Medicine	(1939),* (1940, 2)*	3

* Licenses have not been issued.

† These applicants received the M.B. degree and will receive the M.D. degree on completion of internship. Licenses have not been issued.

Wisconsin September Report

The Wisconsin State Board of Medical Examiners reports the oral and practical examination for medical licensure held at Madison, Sept. 11, 1941. The examination included 10 questions. An average of 75 per cent was required to pass. One candidate was examined and passed. Five physicians were licensed to practice medicine by reciprocity. The following schools were represented:

PASSED		
School	Year Grad.	Number Passed
Marquette University School of Medicine	(1941)	1

LICENSED BY RECIPROCITY		
School	Year Grad.	Reciprocity with
University of Arkansas School of Medicine	(1937)	Arkansas
University of Illinois College of Medicine	(1934), (1937)	Illinois
Boston University School of Medicine	(1933)	Maine
University of Wisconsin Medical School	(1938)	Wyoming

Tennessee October Report

The Tennessee State Board of Medical Examiners reports the written examination for medical licensure held at Memphis, Oct. 1-4, 1941. The examination covered 10 subjects and included 100 questions. An average of 75 per cent was required to pass. Nineteen candidates were examined, 16 of whom passed and 3 failed. The following schools were represented:

PASSED		
School	Year Grad.	Number Passed
Temple University School of Medicine	(1939)	1
University of Tennessee College of Medicine	(1941, 15)	15

FAILED	
School	Year Grad.
Long Island College of Medicine	(1940)
University of Tennessee College of Medicine	(1941, 2)

Bureau of Legal Medicine and Legislation

MEDICOLEGAL ABSTRACTS

Malpractice: Syphilis Transmitted by Blood Transfusion; Statute of Limitations.—The patient gave birth to a child June 26, 1930. The attending physician became alarmed at her loss of blood and summoned the defendant physician to give a transfusion. The patient's brother volunteered to supply the necessary blood and the defendant used it without testing for syphilis. The defendant did not see the patient again until March 1931, prior to which time it had been discovered that she was infected with syphilis, allegedly the result of the blood transfusion. There was evidence that the defendant, on March 26, agreed to cure the patient of her syphilitic condition and treatment was instituted. The patient died, however, April 2, following an injection of neoarsphenamine. Thereafter, on Feb. 14, 1933, the administrator of the patient's estate brought suit against the defendant. Pending the action, the defendant died and his executor was substituted as a party defendant. The trial court directed a verdict for the defendant and the plaintiff appealed to the Supreme Court of Errors of Connecticut.

The complaint in this case asserted three distinct bases of recovery: first, damages for the death of the patient caused by the defendant's negligence; second, damages "for the disease," for the mental and physical suffering of the patient and for the expenses incurred by reason of the defendant's negligence in the transfusion of blood, and, third, damages for the breach of an agreement to cure the patient. The defendant's answer was in effect a general denial, and by way of special defense it was contended that the applicable statute of limitations had barred each count of the complaint. Section 5987 of the General Statutes of Connecticut provides that an action surviving to or brought by an executor or administrator for injuries resulting in death, whether instantaneous or otherwise, or whether caused by the negligence of the defendant or by his wilful, malicious or felonious act, must be brought within one year from the neglect complained of or from the commission of the wilful, malicious or felonious act. Section 6016 provides that an action to recover damages from any physician, surgeon, dentist, hospital or sanatorium for malpractice, error, mistake or failure to effect a cure must be brought within two years from the date of the accrual of the right of action. There is apparent confusion among the authorities, the Court said, as to when the statute of limitations begins to run in actions for malpractice. The general rule, however, is that in a case in which the injury was inflicted at the time of the operation and not occasioned by subsequent treatment or neglect, and there has been no fraudulent concealment by the physican, the period of limitation for actions commences from the date of the wrongful act or omission, although its results may not then have developed. An action for malpractice presents a claim of a hybrid nature, the Court pointed out. In one aspect it may be viewed as based on negligence; in another aspect as based on breach of contract. The term malpractice itself, continued the Court, may be applied to a single act of a physician or to a course of treatment. The statute of limitations begins to run when the breach of duty occurs. When the injury is complete at the time of the act, the statutory period commences to run at that time. When, however, the injurious consequences arise from a course of treatment, the statute does not begin to run until the treatment is terminated.

In the present case, the evidence was undisputed that the defendant physician was not the regular attending physician of the deceased at the time that her child was born. He was called in to perform the blood transfusion and after he performed the transfusion his services to the patient ceased and he did not see her again until March 1931. It follows, the Court said, that so far as the complaint sought to recover damages for the death of the patient, caused by the defendant's negligence, the applicable statute of limitation under the laws of Connecticut was one year; the death having occurred in April 1931 and the action having been commenced in February 1933, this cause of action was barred. So far as the complaint sought to recover damages for the "disease," the mental and physical suffering of the patient and the expenses incurred by reason of the defendant's negligence in transfusion of blood, this cause of action was barred by the two year limitation contained in section 6016 of the General Statutes, the transfusion having occurred on June 26, 1930 and the action having been commenced on Feb. 14, 1933.

The right of action for death, if it was the result of a breach of contract to cure, would run from the day the death occurred, for that was the final termination of the defendant's contract, the final and complete breach. An action for death due to a breach of contract survives, the Court said, and since the death occurred on April 2, 1931, and the action was commenced on Feb. 14, 1933, the two year period prescribed by section 6016 of the General Statutes had not elapsed. There was evidence, the Court pointed out, that the death followed immediately after the injection of neoarsphenamine in the course of the treatment administered to the patient by the defendant, and if the jury believed that the defendant agreed to cure the patient it might have found the defendant liable for that death. In the opinion of the Supreme Court of Errors, therefore, the trial court erred in directing a verdict for the defendant and a new trial was ordered.—*Giambozi v. Peters, 16 A. (2d) 833 (Conn., 1940).*

Malpractice Insurance: Breach of Express Contract to Cure Not Covered by Policy.—The physician plaintiff was insured by the defendant insurance company against loss from claims for damages "on account of any malpractice, error or mistake" by the plaintiff. During the life of the policy the plaintiff expressly agreed to remove certain blemishes from a patient's face. The plaintiff's treatment having failed to remove the disfigurements, the patient sued the plaintiff for breach of express contract and the physician effected a settlement with the patient. Subsequently the plaintiff sued the defendant insurance company to recover the amount of the settlement and the counsel fees he had incurred in defending the patient's action. From a judgment for the insurance company, the physician appealed to the supreme court, appellate division, first department, New York.

The plaintiff contended that the policy written by the defendant was broad enough to cover liability for damages arising from the breach of an express contract to cure. Medicine, said the appellate court, is not an exact science and physicians know they cannot warrant a cure. If a physician does so warrant, as the plaintiff did here, and fails, he is liable for breach of contract even though he used the highest possible degree of professional skill. The legal liability in such a case is entirely different from that arising through "malpractice, error or mistake," which was the contingency provided for in the policy issued by the defendant, and it was with respect to that contingency and that contingency alone that the defendant agreed to save harmless the physician from claims for damages. Judgment for the defendant was accordingly affirmed.—*Safian v. Aetna Life Ins. Co., 24 N.Y.S. (2d) 92 (New York, 1940).*

Society Proceedings

COMING MEETINGS

Annual Congress on Industrial Health, Chicago, Jan. 12-13. Dr. C. M. Peterson, 535 North Dearborn St., Chicago, Secretary.

American Academy of Orthopedic Surgeons, Atlantic City, N. J., Jan. 11-15. Dr. Rexford L. Diveley, 1103 Grand Ave., Kansas City, Mo., Secretary.

Society of American Bacteriologists, Baltimore, Dec. 29-31. Dr. I. L. Baldwin, Agricultural Hall, University of Wisconsin, Madison, Wis., Secretary.

Society of Surgeons of New Jersey, Trenton, Jan. 28. Dr. Walter B. Mount, 21 Plymouth St., Montclair, Secretary.

Current Medical Literature

AMERICAN

The Association library lends periodicals to members of the Association and to individual subscribers in continental United States and Canada for a period of three days. Three journals may be borrowed at a time. Periodicals are available from 1931 to date. Requests for issues of earlier date cannot be filled. Requests should be accompanied by stamps to cover postage (6 cents if one and 18 cents if three periodicals are requested). Periodicals published by the American Medical Association are not available for lending but can be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

Titles marked with an asterisk (*) are abstracted below.

American Journal of Physiology, Baltimore

134:165-440 (Sept.) 1941. **Partial Index**

Blood Volume Changes in Men Exposed to Hot Environmental Conditions for Few Hours. N. Glickman, F. K. Hick, R. W. Keeton and M. M. Montgomery, Chicago.—p. 165.

Differentiation of Respiratory Centers. R. F. Pitts, New York.—p. 192.

Relation of External Pancreatic Secretion to Variations in Blood Sugar. V. B. Scott, U. J. Collignon, H. J. Bugel and G. C. Johnson, Bloomington, Ind.—p. 208.

Production of Experimental Polycythemia in Dogs, Rabbits and Man by Daily Administration of Ephedrine; and by Amphetamine in Dogs. J. E. Davis, Burlington, Vt.—p. 219.

Modification of Pancreatic Response to Secretin by Urine and Urine Concentrates. H. Greengard, I. F. Stein Jr. and A. C. Ivy, Chicago.—p. 245.

Activity in Isolated Sympathetic Ganglions. K. Hare, New York.—p. 251.

Effect of Steroids of Adrenal Cortex and Ovary on Capillary Permeability. S. C. Freed and E. Lindner, Chicago.—p. 258.

Hemoglobin Production Increases with Severity of Anemia. Frieda S. Robscheit-Robbins and G. H. Whipple, New York.—p. 263.

Estimation by Foreign Gas Method of Net (Systemic) Cardiac Output in Conditions Where There Is Recirculation Through Lungs. A. Keys, Minneapolis.—p. 268.

Tolerance of Newborn to Anoxia. J. F. Fazekas, F. A. D. Alexander and H. E. Himwich, Albany, N. Y.—p. 281.

Effect of Anoxia on Absorption of Glucose and of Glycine from Small Intestine. D. W. Northup and E. J. Van Liere, Morgantown, W. Va.—p. 288.

Effect of Gelatin on Muscular Work in Man. P. V. Karpovich and K. Pestrecov, Rochester, N. Y.—p. 300.

Effect of Barbital Anesthesia on Temperature Regulation. A. Hemingway, Minneapolis.—p. 350.

Analysis of Hypothalamic Cardiovascular Control. R. F. Pitts, Philadelphia, M. G. Larrabee and D. W. Bronk.—p. 359.

Vertical Ballistocardiograph: Experiments on Changes in Circulation on Arising, with Further Study of Ballistic Theory. I. Starr and A. J. Rawson, Philadelphia.—p. 403.

134:441-682 (Oct.) 1941. **Partial Index**

Kinetics of Lung Ventilation: Evaluation of Viscous and Elastic Resistance to Lung Ventilation, with Particular Reference to Effects of Turbulence and Therapeutic Use of Helium. R. B. Dean and M. B. Visscher, Minneapolis.—p. 450.

*Influence of Glycine on Muscular Strength. S. M. Horvath, C. A. Knehr and D. B. Dill, Boston.—p. 469

Analysis of Initiation of Fibrillation by Electrographic Studies. G. K. Moe, A. S. Harris and C. J. Wiggers, Cleveland.—p. 473.

Relationship of Renal Blood Pressure and Blood Flow to Production of Experimental Hypertension. M. Friedman, H. Sugarman and A. Selzer, with the collaboration of Margaret Hooper, San Francisco.—p. 493.

Mechanism of Enhanced Diabetes with Inflammation. V. Menkin, with the assistance of M. A. Kadish, Boston.—p. 517.

Iodine Fixation in Thyroid as Influenced by Hypophysis and Other Factors. C. P. Leblond and P. Süe, Ivry, France.—p. 549.

Investigation of Chemical Temperature Regulation. A. Hemingway and S. R. Hathaway, Minneapolis.—p. 596.

Mechanism of Coagulant Action of Daboia Venom. G. Edsall, Jamaica Plain, Mass.—p. 609.

Thyroid Activity After Iodine Ingestion. G. C. Ring, Columbus, Ohio.—p. 631.

Effect of Varying Resistance-Load and Input-Load on Energetics of Surviving Mammalian Heart. L. N. Katz, K. Jochim, E. Lindner and M. Landowne, Chicago.—p. 636.

Pancreatic Secretagogue Action of Products of Protein Digestion. J. E. Thomas and J. O. Crider, Philadelphia.—p. 656.

*Influence of Physical Work on Physiologic Reactions to Thermal Environment. C.-E. A. Winslow and A. P. Gagge, New Haven, Conn.—p. 664.

Influence of Aminoacetic Acid on Muscular Strength.—Horvath and his associates determined the grip strength of 8 men twice a day for eleven weeks. Four subjects received 6 Gm. of aminoacetic acid (glycine) daily for eight weeks, 2 received it for four weeks and then placebos and 2 served as controls for nine weeks and then 1 of them was given 12 Gm. of aminoacetic acid daily for two weeks. Improvement in the strength of the subjects receiving aminoacetic acid was no greater than that of those given placebos. Creatinine or creatine excretion showed no changes attributable to the ingestion of aminoacetic acid.

Reactions to Thermal Environment and Physical Work.—Winslow and Gagge studied the reactions to various atmospheric conditions of 2 unclothed men performing active physical work on a bicycle ergometer at such a rate as to increase their metabolism to more than 300 Kg. calories per hour. The radiation area was the same as that for the resting subject, approximately 70 per cent of the body surface area. The convection constant of a subject pedaling at a rate of some thirty revolutions per minute was increased in cooling power to an air movement of 30 to 40 cm. per second. The increased secretion of sweat, with consequent evaporative cooling, balanced perfectly with the increased heat which must be dissipated as a result of the high metabolism. The evaporative regulation of the working subject operates so effectively that the cutaneous temperature is constant. Actually it is lower for the working than for the resting body. It seems that under these circumstances the internal temperature and not the cutaneous temperature must control the sweat-secreting mechanism. Maximal comfort is experienced by both working and resting subjects at about 2 degrees C. (3.6 degrees F.) below the point at which active secretion of sweat begins.

Anesthesiology, New York

2:489-610 (Sept.) 1941

Summary of Studies on Optimal Composition of Local Anesthetic Solutions. M. L. Tainter, San Francisco.—p. 489.

Protection from Cyclopropane-Epinephrine Tachycardia by Various Drugs. C. R. Allen, J. W. Stutzman, H. C. Slocum and O. S. Orth, Madison, Wis.—p. 503.

Regional Anesthesia for Operations About Neck and Upper Extremity. R. C. Adams, Rochester, Minn.—p. 515.

Apnea During Anesthesia: II. Influence of Morphine Alone and Combined with Atropine or Scopolamine. C. L. Burstein, New York.—p. 530.

Anesthetic Potency and Biochemical Effects of 1 and 2 Chlor Propene-1 and 1 and 2 Brom Propene-1. B. E. Abreu, Atlanta, Ga.; S. A. Peoples, Tuscaloosa, Ala.; C. A. Handley, Vermillion, S. D., and D. F. Marsh, San Francisco.—p. 535.

Suprascapular Nerve Block. H. M. Wertheim and E. A. Rovenstine, New York.—p. 541.

Variation of Oil-Water Distribution Ratio of Divinyl Ether with Concentration. W. L. Ruigh, New Brunswick, N. J., and A. E. Erickson, Rahway, N. J.—p. 546.

Development of Anesthesia. T. E. Keys, Rochester, Minn.—p. 552.

Archives of Neurology and Psychiatry, Chicago

46:569-760 (Oct.) 1941

*The Wernicke Syndrome. N. Jolliffe, H. Wortis and H. D. Fein, New York.—p. 569.

*Electroencephalograph as Aid in Study of Narcolepsy. J. B. Dynes and K. H. Finley, Boston.—p. 598.

Cortical Frequency Spectrum in Epilepsy. F. A. Gibbs, W. G. Lennox and Erna L. Gibbs, Boston.—p. 613.

Cutaneous Pressure Vibration Spots and Their Underlying Tissues. B. von H. Gilmer and S. R. Haythorn, Pittsburgh.—p. 621.

Effect of Nicotinic Acid and Related Substances on Intracranial Blood Flow of Man. C. D. Aring, H. W. Ryder, E. Roseman, M. Rosenbaum and E. B. Ferris Jr., Cincinnati.—p. 649.

Muscular Shortening and Dystrophy: Heredofamilial Disease. A. Hauptmann and S. J. Thannhauser, Boston.—p. 654.

Characteristics of After Discharge Following Cortical Stimulation in Monkey. M. R. Sapirstein, New York.—p. 665.

*Anticonvulsive Action of Azosulfamide in Patients with Epilepsy. M. E. Cohen and S. Cobb, Boston.—p. 676.

Physiology of Spinal Cord: I. Role of Anterior Column in Hyperreflexia. O. R. Hyndman, Iowa City.—p. 695.

Cerebral Arteriography: Its Place in Neurologic Diagnosis. S. W. Gross, New York.—p. 704.

Wernicke Syndrome.—Jolliffe and his associates review the data on the 27 patients with Wernicke's syndrome admitted to Bellevue Hospital from 1935 to 1940. In 3 the condition was of nonalcoholic origin; 2 were depressed and refused to eat, and 1 had pulmonary tuberculosis associated with vomiting. However, the fact that in all the reported cases the disease occurred in malnourished persons suggests that the syndrome is of nutritional rather than of toxic or alcoholic origin. Peripheral neuropathy was present in 25 patients, and in each it preceded or accompanied the ophthalmoplegia. The precedence or concomitance of this syndrome tends to confirm Alexander's con-

tention that less thiamine hydrochloride is required to protect against angiodegeneration than is necessary to preserve the functional integrity of the peripheral nerves. In addition to peripheral neuropathy encephalopathy due to nicotinic acid deficiency was observed in 9 patients, stomatitis due to nicotinic acid deficiency in 9, dermatitis due to nicotinic acid deficiency in 3 and riboflavin deficiency in 1. Thirteen patients recovered, and 12 of these were left with a residual Korsakoff syndrome, which does not show a consistent response to thiamine hydrochloride as has frequently been claimed.

Narcolepsy.—From a study of the electroencephalograms of 22 narcoleptic patients Dynes and Finley observe that the waking records of 17 were normal, as were those of the 16 who had attacks during the electroencephalographic recording, that is, the patterns were in all instances similar to those observed during the physiologic sleep of normal persons. The patterns of the remaining 5 patients were atypical or abnormal, suggesting that the neurophysiologic disturbance was more widespread. The fact that abnormal waking patterns differed in these 5 patients suggests that the location or the character of the lesion also differed in each case.

Azosulfamide in Epilepsy.—Cohen and Cobb describe the results that they obtained in 10 patients with severe epilepsy with the anticonvulsant dye disodium 4-sulfamidophenyl-2'-azo-7'-acetylamino-1'-hydroxynaphthalene-3', 6'-disulfonate (azosulfamide). The results do not establish this drug as an efficient aid in the treatment of epilepsy, but they do suggest the possibility. The sulfanilamide fraction appears to be the important one in producing the anticonvulsive effect. There is no evidence to suggest whether the effect is due to "direct" or "indirect" action on the nervous system. Either or both are possible. It is possible that the effect produced is due to the property sulfanilamide possesses of inhibiting the action of carbonic anhydrase.

Archives of Otolaryngology, Chicago

34:687-864 (Oct.) 1941

Repair of Postoperative Mastoid Fistula: Report of Method. H. I. Lillie and P. N. Pastore, Rochester, Minn.—p. 687.
Fate of Autogenous Septal Cartilage After Transplantation in Human Tissues. L. A. Peer, Newark, N. J.—p. 696.
Electrical Phenomena of Cochlea in Man. H. B. Perlman and T. J. Case, Chicago.—p. 710.
Modern Treatment of Acute Tonsillitis by Injection of Bismuth Compounds. A. Monteiro, Rio de Janeiro, Brazil, South America; edited by L. E. Silcox, Philadelphia.—p. 719.
Recent Fracture of Nasal Base Lines of Both Outer Nasal Walls, with Divergent Displacement: Orthopedic Procedures for Obtaining Anatomic Reduction of Osseous and Cartilaginous Nasal Framework. M. F. Metzenbaum, Cleveland.—p. 723.
Vasomotor Rhinitis: Its Causation and Treatment. J. S. Stovin, New York.—p. 736.
Ultra-High Frequency Diathermy in Otolaryngology, with Especial Reference to Dosage Measurement. R. W. Teed and J. D. Kraus, Ann Arbor, Mich.—p. 743.
Laboratory Analysis of Content of Tonsil Crypts as Obtained by Wet Suction Technic. G. W. McAuliffe and Marguerite Leask, New York.—p. 758.
Position Malignancy. F. E. Motley, Charlotte, N. C.—p. 771.
*Massive Doses of Vitamins A and D in Prevention of Common Cold. I. G. Spiesman, Maywood, Ill.—p. 787.
Management of Sinusitis in Cases of Bronchiectasis. R. L. Goodale, Boston.—p. 792.
*Some Experiences with Sinusitis in Swimmers. J. H. Maxwell, Ann Arbor, Mich.—p. 797.
Sulfanilamide and Its Derivatives. D. S. Cunning and D. Guerry 3d, New York.—p. 809.

Vitamins to Prevent Common Cold.—Spiesman observed 54 sufferers from the chronic cold for one to three winters; 7 were given massive doses of vitamin A, 7 vitamin D and 40 both vitamins. He found that neither vitamin A nor vitamin D when given separately had any immunizing effect on the incidence or severity of the patients' colds, but that when massive doses of the two vitamins were given together the number and the severity of the colds of 80 per cent of the subjects were significantly reduced. Vitamin therapy for the common infectious cold is not offered as a panacea. Average susceptibility and the emotional state of the subject as affected by an innately unstable vasomotor mechanism must be considered.

Sinusitis in Swimmers.—During the last ten years 23 patients with acute fulminating sinusitis or its complications, according to Maxwell, have been admitted to the University Hospital; in 22 the infection extended into the calvarium or the intracranial contents, and in 13 the disease was apparently due to swimming. Diffuse osteomyelitis occurred in 2, epidural abscess in 1, subdural abscess in 1 and abscess of the frontal lobe of the brain in 8. After surgical procedures all the patients recovered except 1, whose death on the second day after a Killian operation was attributed to massive cerebral edema associated with an unsuspected abscess of the frontal lobe. Bacteriologic studies demonstrated a growth of staphylococci in all except 2 patients; for these there was no bacteriologic report. Because of the staphylococcic origin of most of these fulminating infections, the early use of sulfathiazole is urged. It is proposed that the cause of acute fulminating sinusitis after swimming is the introduction of virulent organisms into a normal sinus which has not had the advantage of instituting local barriers to infection. The rapidly appearing signs of intracranial complications in acute fulminating sinusitis suggest that intracranial infection is established by the time frank sinal suppuration appears, and therefore the rationale of draining an acutely infected frontal sinus within the first few days to prevent intracranial complications is questioned.

Arkansas Medical Society Journal, Fort Smith

38:99-114 (Oct.) 1941

Unilateral Renal Disease Associated with Hypertension. C. L. Wilson, Fort Smith.—p. 99.
Bedside Diagnosis of Cardiac Arrhythmias. D. Rowland, Hot Springs National Park.—p. 102.

Bulletin New York Academy of Medicine, New York

17:735-822 (Oct.) 1941

Newer Surgery of Heart and Large Vessels: Medical Aspects. H. M. Marvin, New Haven, Conn.—p. 737.
Morphologic and Functional Alterations of Coronary Circulation. J. T. Wearn, Cleveland.—p. 754.
Effort, Trauma, Occupation and Compensation in Heart Disease. A. M. Master, New York.—p. 778.
Heparin and Thrombosis. C. H. Best, Toronto, Canada.—p. 796.

Canadian Medical Association Journal, Montreal

45:201-294 (Sept.) 1941

Progress of Medical Service Since Advent of War. R. M. Gorssline, Ottawa, Ont.—p. 201.
Surgical Treatment of Goiter. H. G. Armstrong, Toronto.—p. 204.
Avertin-Nitrous Oxide Anesthesia in Thyroidectomy. K. M. Heard, Toronto.—p. 209.
Physiologic Medicine in Modern Practice. B. T. McGhie, Toronto.—p. 212.
Plastic Correction of Protruding Ears in Children. H. Baxter, Montreal.—p. 217.
Congenital Aplasia of Costal Cartilages: Report of Case. C. S. Barker, Toronto.—p. 221.
"Surgical Glove" Dermatitis. J. F. Burgess, Montreal.—p. 222.
Cystic Fibrosis of Pancreas. F. W. Jeffrey, Ottawa, Ont.—p. 224.
Treatment of Osteomyelitis of Small Bones with X-Ray. R. M. Tait, Vancouver, B. C.—p. 229.
Limitations of Artificial Pneumothorax. J. L. D. Mason, Montreal.—p. 231.
Further Observations on Treatment of Convulsions by Dilantin Sodium. W. A. Hawke, Toronto.—p. 234.
Subacute Myocardial Infarction or Necrosis. S. T. Laufer, Halifax, N. S.—p. 236.
Paresis of Larynx. V. R. Lapp, Hamilton, Ont.—p. 239.
Sulfathiazole Anuria with Recovery. H. K. Detweiler, A. MacKay and A. I. Willinsky, Toronto.—p. 242.
Prevention—Treatment of Choice in Pulmonary Embolism. J. E. Ayre, Montreal.—p. 243.
Influenza in Regina General Hospital. A. Bryant, Regina, Sask.—p. 247.
Gonorrhea in the Female. E. N. East and S. A. McFetridge, Vancouver, B. C.—p. 250.
Intra-Abdominal Hemorrhage. G. Fleet and D. Ackman, Montreal.—p. 254.
Case in Which Both Pulmonary Veins Emptied into Persistent Left Superior Vena Cava. J. F. A. McManus, Kingston, Ont.—p. 261.

Canadian Public Health Journal, Toronto

32:435-490 (Sept.) 1941

Adaptation of Venereal Disease Control Program to National Defense. R. A. Vonderlehr, Washington, D. C.—p. 454.
Improving Nutrition via the Family Budget. Marion Harlow, Montreal.—p. 459.
Chronic Fatigue Symptoms Among Industrial Workers. R. V. Ward, Montreal.—p. 464.
Papain Digest Mediums and Standardization of Mediums in General. I. N. Asheshov, London, Ont.—p. 468.
Necessity of Provincial Plumbing Codes. A. Cousineau, Montreal.—p. 472.

Cancer Research, Baltimore

1:685-770 (Sept.) 1941

Production of Cancer by Some New Chemical Compounds: Factors Affecting Latent Period of Tumor Production. J. T. Bradbury, W. E. Bachmann and M. G. Lewisohn, Ann Arbor, Mich.—p. 685.
Comparative Carcinogenicity of Some Cholanthrene Derivatives. L. W. Law and Marjorie Lewisohn, Bar Harbor, Maine.—p. 695.
Diet and Hepatic Tumor Formation. J. A. Miller, D. L. Miner, H. P. Rusch and C. A. Baumann, Madison, Wis.—p. 699.
Failure of Choleic Acids of Carcinogenic Hydrocarbons to Alter Permeability of Marine Eggs and of Mammalian Erythrocytes. B. Lucké, Philadelphia; A. K. Parpart, Princeton, N. J., and R. A. Ricca, Woods Hole, Mass.—p. 709.
Genetic Resistance of Transmissible Sarcoma in Fowl. R. K. Cole, Ithaca, N. Y.—p. 714.
Rapid Growth of Bronchiogenic Carcinoma. M. S. Eveleth and N. C. Wetzel, Cleveland.—p. 721.
Influence of Heptaldehyde on Pregnancy in Rats. C. Carruthers and R. E. Stowell, St. Louis.—p. 724.

Connecticut State Medical Journal, Hartford

5:717-796 (Oct.) 1941

Physiologic Effects of Cold. H. G. Barbour, New Haven.—p. 719.
Low Temperature Therapy of Malignancy. J. B. Herrmann, New Haven.—p. 721.
Connecticut's Part in Development of Psychiatry in America. C. C. Burlingame, Hartford.—p. 727.
Scarlet Fever Immunization. C. G. Thompson, Norwich.—p. 736.
Observations on Simpler Technic in Scarlet Fever Immunization: Preliminary Report. C. L. Thenebe, Hartford.—p. 737.
Some Clinical Oversights of Significance. M. Backer, Bridgeport.—p. 741.
Malignant Neurofibroma. F. E. Tracy, Durham.—p. 753.
Help Conserve Hearing. J. E. Davis, Hartford.—p. 754.

Illinois Medical Journal, Chicago

80:265-352 (Oct.) 1941

Diagnosis of Carcinoma of Esophagus. J. B. Costen and W. T. K. Bryan, St. Louis.—p. 274.
Treatment of Pneumonia. W. L. Winters, W. W. Fox and R. Rosi, with technical assistance of Dolores Lammers, Chicago.—p. 280.
Early Diagnosis of Brain Tumors. A. E. Walker, Chicago.—p. 286.
Spontaneous Hemorrhage in Sheath of Rectus Abdominis Muscle. E. P. Coleman and D. A. Bennett, Canton.—p. 292.
*Bone Carcinomatosis Simulating Pernicious Anemia: Case Report. B. Markowitz, Bloomington.—p. 296.
Clinical Aspects of Vitamin Deficiencies in Ophthalmology. P. C. Kronfeld, Chicago.—p. 298.
Clinical Aspects of Vitamin Deficiency in Ear, Nose and Throat. L. Wallner, Chicago.—p. 304.
Management of Peripheral Vascular Disease. G. de Takats, Chicago.—p. 307.
Conservative Use of Artificial Pneumothorax. G. H. Vernon, Springfield.—p. 313.
Potential Inguinal Hernia, with Especial Reference to Direct Hernia. H. L. Baker, Chicago.—p. 317.
Arteriosclerotic Heart Disease. R. S. Berghoff, Chicago.—p. 320.
Immunization Against Common Communicable Diseases. F. H. Maurer, Peoria.—p. 323.
Dorsolumbar Syndrome, with Special Reference to Referred Pain. F. W. Slobe, Chicago.—p. 332.
*Studies of Feces and Clinical Conditions Following Ingestion of Grape Juice. S. A. Portis and W. I. Fishbein, Chicago.—p. 336.

Carcinomatosis of Bone Simulating Pernicious Anemia.—Markowitz believes that the premortem diagnosis of carcinomatosis of bone simulating pernicious anemia would be made more often if the possibility was borne in mind, especially when the compensatory blood changes do not follow intensive treatment with liver extract. He cites a case in which there were the typical blood changes which simulate pernicious anemia and the other factors which should refute such a diagnosis. The patient, a white woman aged 60, complained of prolonged weakness and pains in the legs. She had been treated with liver extract. While a differential blood count was being made 16 normoblasts and 5 per cent myelocytes were encountered. There was a moderate disproportion in the erythrocytes, with increasing numbers of macrocytes and moderate poikilocytosis. The most compatible diagnosis was pernicious anemia, and blood transfusion was administered and liver extract was given subcutaneously and orally, but after two weeks of treatment there was little change in the blood picture. The diagnosis was questioned, but before much more could be done the patient died, three weeks after treatment with liver extract was begun. At necropsy essential pathologic changes were observed in the stomach and the bone marrow. The stomach was of normal size, but along the greater curvature, in about the midportion, there was an elevated rounded tumor. Microscopic examination revealed a typical adenocarcinoma. The bone marrow was bright red and was interspersed with small purple-gray areas. On microscopic examination large groups of tumor cells were seen to have invaded the bone. The strands of marrow tissue in some areas were rich in myelocytic cells. The large number of myelocytes and normoblasts was not typical of primary anemia. This, together with the history of previous liver therapy with no apparent benefit, should suggest carcinomatosis of the bone marrow.

Effect of Grape Juice on Intestinal Flora.—Portis and Fishbein determined the effect that grape juice had on the intestinal flora of 50 institutionalized but normally active patients. The amount of gram-positive organisms was definitely increased by the daily ingestion of 24 ounces (720 cc.) of grape juice divided into three doses. The increase could be maintained by the daily ingestion of 8 ounces (240 cc.). Few if any acidophilus bacilli, as determined by stool cultures, were found in the stools of patients before grape juice was added to the diet. However, after its continued use a definite increase in the number of acidophilus bacilli was observed. The 50 subjects tended to constipation, and most of them had to resort daily to drastic laxatives, but after grape juice was added to the diet none suffered from constipation and none used laxatives during the experiment. Since gram-positive organisms are a factor in calcium metabolism it is possible that an increase in calcium absorption occurs in the intestinal tract in an aciduric medium. Furthermore, if an aciduric flora inhibits the growth of proteolytic organisms, there may be some relation between the change of flora and the absence of the so-called intestinal toxemia.

Journal of Nervous and Mental Disease, New York

94:133-264 (Aug.) 1941

Blood Phosphorus in Mental Diseases. F. Pascual del Roncal, Madrid, Spain.—p. 133.
Etiology of Psychosis of Dementia Paralytica with Preliminary Report of Treatment of Case of This Psychosis with Metrazol. Vivian Bishop Kenyon, Osawatomie, Kan., and D. Rapaport, Topeka, Kan.—p. 147.
Effect of Menstruation on Seizure Incidence. W. W. Dickerson, Caro, Mich.—p. 160.
Postconcussion Syndrome: Clinical Entity. J. M. Wittenbrook, Columbus, Ohio.—p. 170.
Compact Container for Olfactory Tests. M. T. Moore, Philadelphia.—p. 177.
Music—Aid in Management of Psychotic Patient: Preliminary Report. I. M. Altshuler and Bessey H. Shebesta, Eloise, Mich.—p. 179.
Infantilism in Male, Cured with Hormones: Case. S. Koster, Amsterdam, The Netherlands.—p. 184.

94:265-404 (Sept.) 1941

Estrogen Therapy in Psychoses. C. C. Burlingame and Marjorie B. Patterson, Hartford, Conn.—p. 265.
Preliminary Survey of Motility in Children. J. D. Teicher, New York.—p. 277.
Experimental Insulin Shock, Particularly in Guinea Pig. F. M. Allen, New York.—p. 305.
Asymptomatic Vertebral Fractures in Epilepsy: Comparison with Vertebral Fractures Due to Metrazol Induced Convulsions. M. T. Moore, N. W. Winkelman and L. Solis-Cohen, Philadelphia.—p. 309.
Deforming Dystony: Its Kinesiologic Analysis. M. S. Burman, New York.—p. 324.
Syndrome of Time Agnosia. G. M. Davidson, New York.—p. 336.

94:405-528 (Oct.) 1941

Acute Demyelinizing Processes in Nervous System. A. J. E. Akelaitis and P. H. Garvey, Rochester, N. Y.—p. 405.
Félix Vicq d'Azyr and Benjamin Franklin. R. Spillman, New York.—p. 428.
Huntington's Chorea. H. G. Hadley, Washington, D. C.—p. 445.
Toxic Psychosis Due to Thiocyanate: Case Report. M. R. Plesset, Norristown, Pa.—p. 447.
*Intracranial Lesions as Cause of Sudden Death. E. V. Swift and F. P. Moersch, Rochester, Minn.—p. 452.
Rorschach Study of Psychotic Personality in Uniovular Twins. G. W. Kisker and N. Michael, Columbus, Ohio.—p. 461.

Intracranial Lesions and Sudden Death.—Among 234 cases of sudden death Swift and Moersch found that in 22 death was due to intracranial conditions: in 18 to hemorrhage, in 2 to tumor, in 1 to infarction and in 1 to epilepsy. Immediate death from intracranial causes is rare. A few patients lived from ten to thirty minutes after the fatal episode; most of them lived from one to five hours. Cardiac hypertrophy was present in 78.9 per cent of the cases of intracranial hemorrhage and infarction. The most common symptom complex consists of severe sudden headache often associated with vomiting, stiff neck and sudden coma, especially when the hemorrhage is profuse. Other diagnostic features are convulsive seizures,

either focal or general in character, dilatation of the pupil on the side of the hemorrhage and generalized spasticity. Hemiplegia may be present in cases of either intracranial hemorrhage or thrombosis. Syphilis did not seem to play any special part in sudden death caused by intracranial lesions.

Journal of Neurophysiology, Springfield, Ill.

4:427-506 (Sept.) 1941

Effect of Chronic Painful Lesions on Dorsal Root Reflexes in Dog. R. Anderson, W. K. Livingston and R. S. Dow, Portland, Ore.—p. 427.
Reflex Activity in Spinal Extensors. J. S. Denslow and G. H. Clough, Kirksville, Mo.—p. 430.
Steady Potential Fields and Neuron Activity. B. Libet and R. W. Gerard, Chicago.—p. 438.
Fatigue and Refractoriness in Nerve. E. T. von Brücke, Marie Early and A. Forbes, Boston.—p. 456.
Acetylcholine Esterase Concentration During Development of Human Fetus. K. A. Youngstrom, Durham, N. C.—p. 473.
Localization of Cerebral Center Activating Heat Loss Mechanisms in Monkeys. L. E. Beaton, W. A. McKinley, C. M. Berry and S. W. Ranson, Chicago.—p. 478.
Endplate Potential During and After Muscle Spike Potential. J. C. Eccles and S. W. Kuffler, Sydney, Australia.—p. 486.

Journal of Nutrition, Philadelphia

22:1-102 (July) 1941

Severe Calcium Deficiency in Growing Rats: III. Serum Calcium of Individual Animals During Development of Calcium Deficiency. D. M. Greenberg and W. D. Miller, Berkeley, Calif.—p. 1.
Further Observations of Riboflavin Deficiency in Dog. H. R. Street, G. R. Cowgill and H. M. Zimmerman, New Haven, Conn.—p. 7.
Dependence of Fetal Growth and Storage of Calcium and Phosphorus on Parathyroid Function and Diet of Pregnant Rats. M. Bodansky and Virginia B. Duff, Galveston, Texas.—p. 25.
Goitrogenicity of Soybean. H. S. Wilgus Jr., F. X. Gassner, Fort Collins, Colo.; A. R. Patton, Bozeman, Mont., and R. G. Gustavson, Boulder, Colo.—p. 43.
Magnesium Balance Studies with Infants. C. F. Shukers, Elizabeth M. Knott and F. W. Schultz, Chicago.—p. 53.
Nutritive Properties of Steam-Rendered Lard and Hydrogenated Cottonseed Oil. R. Hoagland and G. G. Snider, Beltsville, Md.—p. 65.
III. Avian Thiamine Deficiency: Characteristic Symptoms and Their Pathogenesis. R. L. Swank and O. A. Bessey, Boston.—p. 77.
Effect of Dietary Calcium and Phosphorus on Assimilation of Dietary Fluorine. Margaret Lawrenz and H. H. Mitchell, Urbana, Ill.—p. 91.

22:103-222 (Aug. 11) 1941. **Partial Index**

Excretion of Selenium by Rats on Seleniferous Wheat Ration. H. D. Anderson and A. L. Moxon, Brookings, S. D.—p. 103.
Improved Diets for Nutritional and Pathologic Studies of Choline Deficiency in Young Rats. R. W. Engel and W. D. Salmon, Auburn, Ala.—p. 109.
Growth Curve of Albino Rat in Relation to Diet. T. F. Zucker, Lilian Hall, Margaret Young and Lois Zucker, New York.—p. 123.
Growth and Calcification on Diet Deficient in Phosphate But Otherwise Adequate. T. F. Zucker, Lilian Hall and Margaret Young, New York.—p. 139.
Effect of Heat on Availability of Iron of Beef Muscle. Helen G. Oldham, Chicago.—p. 197.

Medicine, Baltimore

20:251-396 (Sept.) 1941

Adult Scurvy and Metabolism of Vitamin C. Elaine P. Ralli and S. Sherry, New York.—p. 251.
*March Hemoglobinuria: Studies of Clinical Characteristics, Blood Metabolism and Mechanism, with Observations on Three New Cases and Review of Literature. D. R. Gilligan and H. L. Blumgart, Boston.—p. 341.

March Hemoglobinuria.—Recently Gilligan and Blumgart encountered 3 patients with march hemoglobinuria; in 1, an insurance broker, the hemoglobinuria developed on repeated occasions during short, brisk walks, and in the other 2 patients, college athletes, it developed during strenuous runs of one and a half and five miles. The athletes showed albuminuria at no time except after strenuous runs, and in the insurance broker it developed only at the time of hemoglobinuria or after a walk sufficient to produce hemoglobinemia. Two of the patients had slight chronic icterus, most evident in the scleras. The authors point out that their studies and those of other investigators suggest that "physiologic" hemoglobinemia and hemoglobinuria occur more commonly than their infrequent diagnosis suggests. March hemoglobinuria will now, perhaps, be observed more frequently because of the present strenuous military training. It is important to differentiate this relatively benign condition from the serious conditions that may lead to hematuria.

Michigan State Medical Society Journal, Muskegon

40:569-664 (Aug.) 1941

Surgical Dyspepsias. A. L. Lockwood, Toronto, Canada.—p. 593.
Xanthoma of Tongue: Case Report. F. A. Lamberson, Detroit.—p. 603.
Cerebral Anoxia and Craniocerebral Injuries. F. Schreiber, Detroit.—p. 603.
Pneumonia: Clinical Diagnosis. A. F. Jennings, Detroit.—p. 606.
Eunuchism: Treatment with Testosterone Propionate: Report of a Case. H. L. Miller, Detroit.—p. 609.
Uterine Inertia in First Stage of Labor. R. S. Siddall, Detroit.—p. 612.

40:665-760 (Sept.) 1941

Planned Parenthood: Its Contribution to National Preparedness. R. N. Pierson, New York.—p. 691.
Primary Carcinoma of Scrotum: Report of Case. K. Alcorn, Bay City.—p. 696.
Highlights of Twenty-Five Years of Service. Marjorie Euler, Topeka, Kan.—p. 698.
Gallbladder Disease: Surgical Treatment. L. J. Gariepy and J. H. Dempster, Detroit.—p. 705.
Epilepsy as Traffic Hazard. L. E. Himler, Ann Arbor.—p. 707.
Intravenous or Retrograde Pyelography? R. J. Hubbell and R. C. Hildreth, Kalamazoo.—p. 710.

Minnesota Medicine, St. Paul

24:805-900 (Oct.) 1941

Roentgenologic Manifestations of Injuries to Chest. L. R. Sante, St. Louis.—p. 819.
Postpartum Handling of Late Toxemia of Pregnancy. C. J. Ehrenberg, Minneapolis.—p. 828.
Clinical Recognition of Coronary Disease. H. E. Richardson, St. Paul.—p. 831.
Role of Drugs in Clinical Management of Coronary Disease. R. V. Sherman, Red Wing.—p. 834.
Retrodisplacement of Uterus. M. O. Wallace, Duluth.—p. 836.
Interpretation of Serologic Tests for Syphilis. F. W. Lynch, St. Paul.—p. 843.
*Chronic Low Grade Oral Temperature of Local Origin in Children. W. R. Shannon, St. Paul.—p. 845.
Practical Application of Protamine Zinc Insulin in Treatment of Diabetes Mellitus. W. A. Stafne, Fargo, N. D.—p. 846.
Alcoholism as a Neurosis. G. R. Kamman, St. Paul.—p. 850.

Chronic Low Grade Fever of Local Origin.—Shannon believes that the possibility that regional warmth due to infection in the nasal sinuses may produce an elevation of oral temperature in children has not been sufficiently emphasized. As a result many such children are erroneously thought to have a generalized low grade fever and are forced to suffer the consequences. In such cases the general body temperature as recorded at the rectum is normal.

New England Journal of Medicine, Boston

225:475-518 (Sept. 25) 1941

Fractures of Forearm and Elbow in Children: Analysis of 364 Consecutive Cases. A. Thorndike Jr. and C. L. Dimmler Jr., Boston.—p. 475.
Measure of Physician's Greatness. C. F. Gormly, Providence, R. I.—p. 481.
Dissecting Aneurysm of Aorta: Report of Case. C. C. Shaw, Bellows Falls, Vt., and H. T. French, Hanover, N. H.—p. 490.
Controlling Clinical Therapeutic Experiments with Specific Serums, with Particular Reference to Antipneumococcus Serums. M. Finland, Boston.—p. 495.

Ohio State Medical Journal, Columbus

37:925-1028 (Oct.) 1941

Diabetic Neuritis. C. D. Aring, Cincinnati.—p. 941.
Clinical Use of Stilbestrol. E. H. Adler and Bessie G. Wiesstien, Cleveland.—p. 944.
Dynamic Enteropathies. F. A. Riebel, Columbus.—p. 946.
Role of Genetics in Cancer Research. F. Blank, Columbus.—p. 947.
Trichinosis Treated with Sulfapyridine. F. M. Wiseley, Findlay, and J. F. Treece, Arlington.—p. 952.
The Private Physician in the Campaign Against Diphtheria. A. Gelperin and C. A. Wilzbach, Cincinnati.—p. 953.
*Topical Use of Sulfathiazole in Decubitus Ulcers: Preliminary Report. J. I. Goodman and J. F. Corsaro, Cleveland.—p. 956.
Torsion of Omentum: Report of Case. C. R. Steinke, Akron.—p. 959.
Transient Pulmonary Edema (Loeffler's Syndrome): Report of Case. A. Baer, Portsmouth.—p. 960.
Staphylococcic Septicemia Treated with Sulfamethylthiazole: Case. A. Glorig Jr., Atlanta, Ga., and H. H. Englander, East Cleveland.—p. 962.
Influenza Epidemics of 1918 and 1941. C. DeCourcy and O. Thuss, Cincinnati.—p. 964.
Clinically Obscure Polyserositis with Silicosis. C. Vilter and R. Ritterhoff, Cincinnati.—p. 967.

Sulfathiazole for Decubital Ulcers.—Goodman and Corsaro pulverized the commercially available sulfathiazole tablets and applied the powder daily, by means of a salt shaker, to the decubital ulcers of 5 chronically ill patients. The ulcers previously had been treated unsuccessfully by other accepted

methods, one for as long as twenty-one months. The quantity of the drug used varied with the size of the ulcer, as sufficient powder to coat the ulcer completely was utilized. The actual amount varied from 1 to 3 Gm. During treatment with sulfathiazole all other treatment, except light cradles or infra-red lamps, was withdrawn. Almost immediately after the sulfathiazole powder was applied the infection cleared up and clean, healthy granulation tissue, followed by healing of unwonted rapidity, appeared. The authors' success with these local lesions led them to use the method for 1 patient with chronic osteomyelitis, 2 with traumatic indolent ulcers of the feet, 1 with draining fistulous tracts in a recently amputated stump and 1 with a stubborn pilonidal sinus. Healing was rapid and complete in each patient.

Pennsylvania Medical Journal, Harrisburg

44:1505-1760 (Sept.) 1941

Acute Segmental Enteritis. R. H. Meade Jr., Philadelphia.—p. 1519.
Analysis of Certain Visual Problems Among Elementary School Children. W. T. Hunt Jr., Huntingdon.—p. 1527.
Correlation of X-Ray and Autopsy Observations. S. J. Hawley, Danville.—p. 1534.
The Coroner and the Medical Examiner. R. P. Custer, Philadelphia. —p. 1539.
Leiomyoma Uteri with Associated Pelvic Inflammatory Disease. J. H. Mering and S. A. Chalfant, Pittsburgh.—p. 1543.
Lithopedion: Report of Case with Review of Literature. T. K. Reeves and G. S. Lipman, Pittsburgh.—p. 1548.
Bronchoscopy in Treatment of Postoperative Pulmonary Atelectasis. W. A. Lell, Philadelphia.—p. 1551.
Acute Appendicitis. L. H. Landon, Pittsburgh.—p. 1559.
Active Immunization Against Tetanus by Combined Subcutaneous and Intranasal Routes. H. Gold, Chester.—p. 1565.
Disruption of Abdominal Wounds. H. R. Owen and Bernardine M. Mahowald, Philadelphia.—p. 1570.
Tension Pneumothorax. J. Grossman, Philadelphia.—p. 1577.
Frontal Lobe Abscess of Otitic Origin. F. H. Krauss, Philadelphia. —p. 1581.
Observations on Eyegrounds of Newborn. M. L. Kauffman, Jenkintown.—p. 1583.
Observations of Larynx in Diseases of Upper and Lower Respiratory Tract. G. L. Whelan, Philadelphia.—p. 1588.
Role of Nephrectomy in Hypertension. B. Hughes, Philadelphia. —p. 1594.
Experience with Routine Contraceptive Advice to Ward Maternity Patients. O. J. Toland, Philadelphia.—p. 1599.
Several Interesting Pathologic Hearts. M. A. Goldsmith, Jenkintown. —p. 1603.

Philippine Medical Association Journal, Manila

21:379-422 (Aug.) 1941

*Unusual Types of Typhoid Infections: IV. Atypical Duration of Febrile Periods. P. T. Lantin, J. Tranquilino, J. Aquino and J. Silva, Manila.—p. 379.
Treatment of Manic Condition with Tincture of Datura Alba. T. Joson, Mandaluyong, and J. M. Kosca, Pasay.—p. 387.
Dacryocystorhinostomy. C. D. Ayuyao and C. V. Yambao, Manila. —p. 391.
Influence of Temperature on Phenol Coefficient of Disinfectants. J. Ramirez and M. V. Mallari, Manila.—p. 395.
Should an Ice Bag Be Applied to the Head of the Hypertensive Patient with Cerebral Hemorrhage? R. V. Guiang and Maria A. Leones-Guiang, Bugallon, Pangasinan.—p. 397.

Atypical Typhoid Infections.—According to Lantin and his colleagues, among 6,000 patients with typhoid 23 had atypical febrile periods, 11 had a fever for not more than ten days and 12 had a febrile period of not less than sixty days. The authors believe that if the condition of such patients is not recognized early they can become dangerous sources of typhoid organisms which may lead to serious epidemics. The fever of the first 11 patients was moderately high and of a variable curve type. Anorexia, abdominal pain, vomiting, chills, tympanism, nausea and articular pains were accompanying symptoms. Slight intestinal hemorrhage, occurring in 1 patient, was the only complication observed. All the patients had a complete and uncomplicated recovery. A definite diagnosis was made on the evidence of positive hemoculture. The protracted fever of the 12 patients lasted from sixty-one to one hundred and fifty-seven days; in the 3 who recovered it averaged ninety-seven days. The fever was prolonged, high, continuous and of a variable curve type. The principal accompanying symptoms were headache, delirium, semiconsciousness and abdominal pain. Complications were many and varied: toxic myocarditis in 10, severe toxemia in 8, pulmonary complications in 7, typhoid asthenia in 4, intestinal hemorrhage in 3, acute hepatitis in 1, acute cholecystitis in 1 and peripheral neuritis in 1. The mortality was 75 per cent. The diagnosis in 4 was based on positive hemocultures and on the necropsy observations of the other 8. Active typhoid lesions were observed at the necropsy of the 9 patients who died.

Surgery, St. Louis

10:535-698 (Oct.) 1941

Cerebral Angiography. J. M. Sanchez-Perez, Madrid, Spain.—p. 535.
Carcinoma of Intrapancreatic Portion of Common Bile Duct. A. Brunschwig and W. E. Clark, Chicago—p. 553.
Method for Collection of Entire Bile Output in Human Patients with Choledochostomy Tubes. J. A. Layne and G. S. Bergh, Minneapolis. —p. 563.
Hypertrophy of Sphincter Choledochus: Cause of Internal Biliary Fistula. E. A. Boyden, Minneapolis.—p. 567.
Comparative Absorption Rate of Sulfanilamide from Pleural Cavity, Peritoneal Cavity and Gastrointestinal Tract in Dogs. H. B. Haag, C. R. Spealman and H. M. McCue, Richmond, Va.—p. 572.
Studies of Antihemolysin Level in Patients with Staphylococcic Infections Treated with Staphylococcus Toxoid. A. B. Longacre, New York.—p. 576.
*Inactivation of Group Specific Isoagglutinins in Relation to Transfusion of Incompatible Plasma, Serum and Ascitic Fluid. H. A. Davis, New Orleans.—p. 592.
Silk: Its Effect and Fate in Intestinal Anastomosis—Experimental Study. C. L. Hoag, J. B. Saunders, H. H. Lindner and J. M. Moore, San Francisco.—p. 604.
*Abdominal Pain in Cyclic Vomiting: Its Differentiation from Acute Appendicitis and Recommendation for Its Treatment. S. Karelitz and S. Blumenthal, New York.—p. 613.
Treatment of Inguinal Hernia by Injections Under Operative Visualization. E. E. Arnheim and H. Neuhof, New York.—p. 624.
Simplified Technic for Amputations Through Thigh. D. A. Willis and S. L. Teitelman, Chicago.—p. 631.
Perforated Leiomyoma of Meckel's Diverticulum: Report of Case. J. D. Koucky and W. C. Beck, Chicago.—p. 636.
Five Tumors of Round Ligament of Uterus—One a Capillary Hemangioma. J. G. Schnedorf and T. G. Orr, Kansas City, Kan.—p. 642.
Hemangioma of Large Bowel. V. C. Hunt, Los Angeles.—p. 651.

Inactivation of Group Specific Isoagglutinins.—Davis tried to determine the fate of incompatible isoagglutinins when they are transfused into the blood of a recipient in the form of plasma, serum or ascitic fluid. In vitro studies showed that the isoagglutinins present in plasma, serum or ascitic fluid could be inactivated by appropriate mixture with a fluid containing opposing isoagglutinins. A mixture of group A and group B plasma in equal proportions inactivated the isoagglutinins in both plasmas so that neither agglutinated erythrocyte suspensions. Such inactivation is greater at a temperature of 37 C. than at lower temperatures. Since temperature plays an important part in isoagglutinin inactivation, incompatible plasma, serum or ascitic fluid should be heated to body temperature before transfusion. The transfusion of cold incompatible biologic fluids is more apt to result in incomplete isoagglutinin suppression, with a resultant agglutination in vivo. Likewise, a rise in temperature of the blood of the recipient, as in fever, might accelerate the phenomenon of inactivation and thereby prevent in vivo agglutination of transfused incompatible fluids. When the isoagglutinin titers of any two biologic fluids are unknown the greatest degree of inactivation of the isoagglutinins will occur if equal volumes of the fluids are used; thus when one is pooling fluids the volume factor should be kept in mind.

Pain in Cyclic Vomiting.—Karelitz and Blumenthal recommend antiketogenic therapy for differentiating the acute abdominal pain of cyclic vomiting from that of appendicitis with vomiting. In the first instance the abdominal discomfort and tenderness become less and the fever and the leukocytosis diminish, whereas in acute appendicitis the abdominal symptoms become more distinct, the tenderness persists and localizes and the fever, tachycardia and leukocytosis continue. In all cases in which the diagnosis is obscure treatment of the ketosis and deranged circulation by continuous intravenous administration of dextrose in saline solution should continue until the diagnosis is clear.

Tennessee State Medical Assn. Journal, Nashville

34:377-422 (Oct.) 1941

Medical Relationships in Industry. C. M. Peterson, Chicago.—p. 377.
Management of Early Syphilis. A. H. Lancaster, Knoxville.—p. 382.
Carcinoma of Rectum. G. H. Kistler, Chattanooga.—p. 390.
Medical Treatment of Peptic Ulcer. W. C. Colbert, Memphis.—p. 396.
Preserving Physiologic Functions in Nasal Surgery. R. G. Reaves, Knoxville.—p. 403.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

Edinburgh Medical Journal

48:577-648 (Sept.) 1941

Future of Postgraduate Teaching. J. K. Slater.—p. 577.
Surgical Aspects of Diseases of Chest. B. M. Dick.—p. 581.
Significance of Systolic Murmurs. D. M. Lyon.—p. 589.
*Pulse Rate in Acute Juvenile Rheumatism. A. J. Glazebrook and S. Thomson.—p. 619.
Inductopyrexia: Its Technic and Application. G. M. Thomson.—p. 629.

Pulse Rate in Acute Juvenile Rheumatism.—Glazebrook and Thomson recorded the pulse rate of 100 boys from 15 to 20 years of age during the first four weeks of their acute rheumatism. All the patients showed tachycardia in the later stages of the disease. Among the 100 boys there were 30 who had subnormal pulse rates in the acute stages of the illness; in another 32 the increase was less than that expected from the rise of temperature. Bradycardia was more common in those suffering from their first attack. The pulse depression of 18 occurred within the first four days of the illness. The depression bore no relationship to the temperature. As the bradycardia followed most types of treatment it cannot be said that the treatment or a vitamin B or C deficiency was a contributing factor. It appears that a depressed pulse in the early stages of the illness is of grave prognostic significance. Permanent cardiac damage developed within six months in 12 of 15 boys with a depressed pulse early in the disease. The authors regard a pulse depression in some cases as an index of the severity of the toxemia and feel that it is due to the action of streptococcus endotoxins.

Indian Medical Gazette, Calcutta

76:385-448 (July) 1941. **Partial Index**

*Toxic Complications of Sulfanilamide Therapy (Analysis of 6,070 Cases Treated in Venereal Department of Government General Hospital, Madras). R. V. Rajam and N. V. Rao.—p. 385.
Study of Cardiac Sounds and Murmurs in Severe Anemia. P. C. Gupta.—p. 392.
Multiple Primary Epidermoid Carcinoma. M. N. De and B. P. Tribedi.—p. 397.
The Arneth Count in the Tropics. Dharmendra.—p. 399.
The Arneth Count in Normal Indians. C. R. Das Gupta.—p. 404.
Note on Fevers of Typhus Group in Assam. L. S. F. Woodhead and U. C. Dutta.—p. 406.
Bacterium Alkalescens in Infection of Urinary Tract and Bacteriophage Therapy. C. L. Pasricha and A. J. H. deMonte.—p. 414.
Notes on Common Skin Diseases: III. Ringworm of Scalp, Favus. N. C. Dey.—p. 416.

Toxic Complications of Sulfanilamide Therapy.—Rajam and Rao discuss the complications that occurred among the 6,070 male and female patients treated with sulfanilamide at the venereal clinic of the Government General Hospital during the last three years. There were 1,765, or 29.08 per cent, reactions; some of them in order of frequency were fever, giddiness, nausea with or without vomiting, headache, muscular weakness, anorexia, numbness and tingling of fingers and toes, abdominal pain, pain in the chest, dermatitis, breathlessness with or without cyanosis and gastrointestinal upsets. Four types of fever, usually occurring between the fifth and tenth day of treatment and either alone or associated with dermatitis, leukopenia or breathlessness, were encountered: (1) a low intermittent fever, the temperature being rarely beyond 101 F., with an evening rise and a morning remission, lasting for a few days; (2) a sudden rise of temperature to 103 or 104 F., preceded by a chill and coming down by crisis in about twenty-four hours; (3) a fever similar to the second except that it continued for about three days and subsided slowly on or about the fourth day, and (4) shivering followed by a temperature of 104 or 105 F. the patient being very ill and toxic and having profound granulocytopenia. The toxic complications were almost equally distributed between the sexes with a preponderance of blood dyscrasias among women. The incidence of granulocytopenia in women was 1:500, whereas in men it was 1:5,000. With the exception of granulocytopenia the other toxic manifestations can be recognized by daily careful observation. It is the authors' opinion that sulfanilamide and its derivatives should be used with greater resolution than they have heretofore and that clinicians should not hesitate to administer the drugs in therapeutically adequate doses when the patients are under daily and careful control.

Revista Clínica Española, Madrid

3:1-88 (July 1) 1941. **Partial Index**

Myasthenia and Gastric Ulcer. D. Furtado and C. George.—p. 16.
*Mester's Reaction in Diagnosis of Rheumatism. T. Cerviá and J. García López.—p. 20.
Insulinic Coma Provoked by 10 Units and Terminating in Death After Eighty Hours. A. D. Borreguero.—p. 23.
Postpoliomyelitic Paralysis of Quadriceps and Its Treatment. V. Sanchis-Olmos.—p. 27.
Presumed Epidemic of "Acute Posterior Funiculitis." J. A. Adrio Mateo.—p. 34.
Etiopathogenesis of Pregnancy Pyelitis. F. Bonilla Martí.—p. 37.

Mester's Test in Diagnosis of Rheumatism.—Cerviá and García López call attention to the immunobiologic reaction which Mester developed for the differential diagnosis of rheumatism. It is an intradermal test with a 0.1 per cent solution of salicylic acid, that is, four or five papules are produced with 1 cc. of this solution and the leukocytes are counted before and thirty and sixty minutes after the intradermal injection. The reaction is regarded as positive if the leukocyte count shows a reduction of 10 per cent or more after the injection. The mechanism of the reaction supposedly is like that of Widal's hemoclastic crisis. The authors employed this method in 32 subjects. Of 18 patients with rheumatism or with a history of this disease 88 per cent showed positive results, independent of the activity of the process or of the administration of salicylate. Of 14 control patients without signs of rheumatic disease 2 had positive reactions. Although the method is simple and of clinical value, it has the disadvantage that the intracutaneous injection of salicylic acid is extremely painful.

Revista Médica de Rosario, Rosario de Santa Fe

31:721-832 (Aug.) 1941. **Partial Index**

*Quantitative Determinations of Sulfapyridine in Blood for Control of Clinical Effects. L. R. Ganem.—p. 779.

Quantitative Determinations of Sulfapyridine in Blood.—Ganem made determinations of the concentration of sulfapyridine in the blood of 35 patients who had 1 Gm. of the drug three times a day, up to a total amount of 20 Gm. in seven days. The author observed that the concentration of sulfapyridine in the blood depends on the capacity of absorption of the digestive tract and on the functions of the kidney. Lack of the drug in the blood or a low concentration indicates lack of absorption or a poor capacity of absorption. Concentrations as high as 20 mg. for each hundred cubic centimeters of blood can be observed in patients with renal diseases. Good results were obtained by the author when the concentration of the drug did not exceed 9 mg. Therefore a concentration of 10 mg. should be regarded as the greatest concentration necessary for obtaining good results from the treatment. According to the author the concentration of sulfapyridine in the blood should be determined in all cases. A concentration of more than 10 mg. per hundred cubic centimeters is an indication for diminishing the dose or stopping sulfapyridine treatment. Accidents from sulfapyridine therapy are caused by the administration of a large dose or by hypersensitivity of the patient to the drug. They can be prevented by the administration of small doses.

Geneeskundig Tijdschr. v. Nederl.-Indië, Batavia

81:507-648 (March 18) 1941. **Partial Index**

Pathologic Anatomic Aspects of Goiter in Batavia. S. Tjokronegoro.—p. 515.
Odontomas and Related Conditions. H. Müller.—p. 545.
Grenz Rays in Treatment of Hemangiomas in Dermatologic Clinic in Leyden. R. D. G. Ph. Simons.—p. 563.
Tumors in Snakes. R. A. M. Bergman.—p. 571.
Melanomas Among Native Population of Netherland East Indies. R. M. Soetidjo Hardjosoekatmo.—p. 582.
Sex Hormones and Formation of Neoplasms. J. W. R. Everse.—p. 605.
*Cutaneous Cancer Among Native Population of Netherlands East Indies. R. E. J. Ten Seldam.—p. 618.
Carcinoma of Meibomian Glands. Sie Boen Lian.—p. 635.

Cutaneous Cancer Among Natives of East Indies.—Ten Seldam presents statistical data which show that cancer of the face is not less frequent among the natives than among Europeans. The protection which the pigmented skin of the natives should provide against the biologic effect of the sun is lost by the great quantity of ultraviolet rays in tropical sunlight, and it is possible that other rays exert a carcinogenic action on the skin.

Book Notices

The Medical Aspect of Boxing. By Ernst Jokl, M.D., Head of Department of Physical Education, Witwatersrand Technical College, Johannesburg, South Africa. Cloth. Pp. 251, with 59 illustrations. Pretoria: J. L. Van Schaik, Limited, 1941.

The material of this volume is divided into two general parts: immediate effects of injuries in boxing, and remote effects of such injuries. The former part deals with the physiology and pathology of different injuries such as the chin knockout, the solar plexus knockout, the heart knockout and the carotid sinus knockout, all due to legal blows. The author produces some evidence to show that the chin knockout, the most common of the four, is due to injury to the medulla chiefly by contre-coup. It differs from the concussion of football and other sports unless the head of the injured boxer strikes the floor. There follows a brief discussion of such conditions as "grogginess" which fall short of the severity of a knockout. The latter part deals with the pathology of delayed effects of repeated blows on the chin, head or other parts. There are citations of numerous cases including some fatalities in the ring, due, in almost every instance, to repeated injuries in former fights.

The author's conclusion, from the medical point of view, is that the dangers inherent in boxing are sufficient to warrant its discontinuance. However, from the human point of view, he feels certain that it will not be discontinued and therefore suggests some protections and precautions.

The book concludes with a number of tables and an extended bibliography. It is well written although somewhat unusual in arrangement, but the field covered is so limited that its chief use will be as a library reference work.

Coming of Age. By Esther Lloyd-Jones, Ph.D., Professor of Education, Teachers College, Columbia University, New York, and Ruth Fedder, Ed.D., Guidance Counselor, Cheltenham Township Public Schools, Elkins Park, Pennsylvania. Cloth. Price, $2.50. Pp. 280. New York & London: Whittlesey House, McGraw-Hill Book Company, Inc., 1941.

This book centers its primary interest in human growth as a part of the process of reaching maturity. Although it is primarily written for young people, many parents will appreciate it in their quest for a way of helping their children to find and give a rich and satisfying life. Professional persons in all varieties of work with young folk will welcome its sound insight, common sense and lack of dogmatism. Personality patterns are drawn realistically and objectively with analyses of family interrelationships and the part each member plays in the whole as well as one member on another. The sum of these observations is a clear picture of the family group as it operates in shaping the personalities of its members. The young person can use this material to help clarify his own picture of himself, both as he has been affected and as he affects others. The parent can find guidance in seeing more clearly the implications of his responsibility to his children.

The first chapters deal with the psychologic factors that go into the forming of personality. Examples are given of the different ways in which individuals meet their needs within their own particular life situations. Emphasis is given to the part played by insecurity and unsureness of self and how this expresses itself differently in different individuals. In growing up, young people must know the necessity of accepting limitations and of developing the abilities they possess.

Growing up inevitably involves adjustments which are discussed in separate chapters—the family, the love relationship, college, vocation. The family group provides the first experience with giving and sharing and as such is the foundation on which later adjustments are based. The home should have provided opportunities for freedom of choice and for carrying responsibility so that a young person will learn to meet emergencies and new situations "with security, poise and stability."

A chapter on men, women and love concerns itself primarily with the distinction between true love and sex attraction and the problems young people express in relation to this. A discussion brings out several concepts, mainly that true love develops slowly, grows as the relationship grows. True happiness can blossom from physical attraction, but the basis for it must be something much more real and lasting. Mature love implies freedom for each individual and therefore necessitates unselfishness, a real sharing of common interests and growth in understanding one another.

Chapters on college and on vocation show the young person discovering himself further in relation to his own needs and sharing with others and lead to the final chapter, "What Can We Believe?" This chapter, which begins "The most distinctive characteristic of man is his quest for values," brings the book to a truly inspired conclusion. Man's eternal quest for goals—for purpose in life—is discussed. Perhaps the sentence that more than any other describes the spirit and purpose of this book is "A person cannot be considered mature until he has, somehow, learned to develop an internal authority that gives him a sense of personal responsibility for making choices in the light of the best he knows."

Principles of Microbiology. By Francis E. Collen, B.S., M.S., Ph.D., Associate Professor of Bacteriology and Preventive Medicine in the Creighton University School of Medicine, Omaha, and Ethel J. Odegard, R.N., A.B., M.A., Instructor in Sciences Applied to Nursing, College of Saint Teresa, Winona, Minnesota. Cloth. Price, $3. Pp. 444, with 158 illustrations. St. Louis: C. V. Mosby Company, 1941.

The task of teaching the student nurse the fundamentals of the preclinical sciences sufficiently well to underwrite intelligent practice is one that is beset with many difficulties. These are, of course, inherent in the writing of a textbook such as the present one, which is directed primarily toward this end, and account in large part for the superficial and fragmentary presentation this volume has in common with most other textbooks in this field.

The content is much the same as that of the usual medical textbook of bacteriology, but the material is rigorously cut and put in the simplest terms. The book is divided into seven sections. The first is an extended introduction which includes a discussion of the general biologic aspects of the bacteria and related organisms as well as a consideration of technics. The second and third sections, both short, are devoted to sterilization and disinfection and to bacterial variation and classification respectively. The fourth is a general consideration of infection, immunity and hypersensitivity. The fifth, and by far the largest, consists of chapters devoted to the pathogenic bacteria, viruses, rickettsiae and pathogenic fungi and protozoa. The sixth section is a consideration of the bacteriology of water and milk, and the seventh an appendix made up of formulas of culture mediums, suggested laboratory exercises and a glossary.

In general this material is up to date and clearly presented, though failure to include at least brief discussions of more recent work, such as that on spirochetosis of dogs in relation to Weil's disease, active immunization to tetanus, and the pneumococcus types comprising group IV, detracts somewhat from this general impression. The extreme degree to which the material has been condensed results in the creation of some false impressions. It is implied, for example, that the chlorination of sewage is equal in importance to the chlorination of water. Similarly it is stated that sugars are unstable to autoclaving and that sugar broths are always sterilized by the intermittent process, the last at variance with common practice in most laboratories in the case of the most frequently used sugars. It is stated also that the fermentations of the staphylococci are definite, whereas these bacteria include a wide variety of physiologic types.

In a number of instances statements are made which are open to some question. Few bacteriologists, and those the life cycle enthusiasts, would agree with the delineation of a "typical" life cycle illustrated on page 133 or the discussion on page 137, for the material presented as established fact is far from being generally accepted. Regarding the epidemiology of poliomyelitis, the statement that "the virus . . . is thought to enter through the respiratory tract. Epidemiological studies . . . have shown that the mosquito probably plays some part in the transmission of the disease" is hardly a fair one when it is all that is devoted to this matter. It is suggested that the proprietary organic mercury compounds are excellent disinfectants, comparing favorably with tincture of iodine, an obvious fallacy. Some may object to the use of the generic name Torula for the asporogenous yeasts, for Cryptococcus is generally used in the medical literature.

In the reviewer's opinion many of these faults could have been ironed out through a rearrangement of the subject matter, making use of space wasted in the extended treatment of water and milk in chapter 13, which is devoted to an unimportant discussion of nursing and microbiology, and elsewhere for a somewhat more rounded presentation of the essential material. In general, however, the presentation is an accurate and balanced one considering the difficulties under which the authors labored.

The book is profusely illustrated, eighteen of the plates being in color. The latter are uniformly good and some, such as those illustrating the cutaneous reactions, should be very useful. The book is somewhat underindexed, though the index is a good one; in a textbook of this sort it would be better to overindex slightly. The type is clear and well printed; there are remarkably few typographic errors for a first edition.

This book will probably prove to be a useful and welcome addition to nursing education textbooks; the physician will find it almost completely useless because of its elementary nature.

Society and Medical Progress. By Bernhard J. Stern. Cloth. Price, $3. Pp. 264. Princeton: Princeton University Press; London: Oxford University Press, 1941.

The author's point of departure is "that medicine, both as a science and a profession, is inextricably bound up with the social process and with scientific developments in other fields." It shares in the cyclic movements of industry, government and education. "The long road to medical science" is built round or over or blasted through vested interests, superstition, bigotry, tradition, quackery, astrology and other obstacles to human progress. Medicine advances most rapidly when it is closest to the life of humanity and stagnates in scholasticism. These truths are told well and illustrated thoroughly, making a work of fundamental value to all who are interested in society and medical progress. The historical is better than the contemporary treatment, although the chapters on urbanization, the conquest of famine, and income and health build a good foundation for an understanding of many present problems. Emphasis is placed on the part played by "tools," buildings, institutions—on everything but the increased knowledge of the physician in the diagnosis and treatment of disease. There is frequent reference and condemnation of the "lag" between discovery and the application of medical advances but almost no mention of the ways by which organized medicine has shortened that lag through scientific testing, standardizing and endorsement or rejection of new developments. Universities and hospitals are given almost sole credit for fixing standards of medical education. It would seem that one significant "lag" has been overlooked—that between the author's knowledge and existing achievements of the medical profession.

Fundamentals of Comparative Embryology of the Vertebrates. By Alfred F. Huettner, Associate Professor of Biology, Queens College, Flushing, N. Y. Cloth. Price, $4.50. Pp. 416, with 168 illustrations. New York: Macmillan Company, 1941.

This is an elementary textbook devoted primarily to the development of the frog, the chick and the fetal membranes of mammals. Only one feature justifies so feeble an addition to the field: this is a series of excellent new stereograms of the frog's egg and the chick embryo. The attempt to make a corresponding series of early stages of human development failed because of the author's lack of familiarity with normal material: his diagrams (figs. 158-163) have many and serious errors. A consideration of experimental work is excluded for lack of space, but there is no excuse for the failure to use the many significant interpretations of normal processes which experimental embryology has given us. The book begins with a detailed discussion of genes, which enjoy greater popularity among zoologists today than ids and idants enjoyed a generation ago. On page 46 one reads "that the chromosomes are the cellular differentiations which control growth and development is easily demonstrated . . ." This is surprising when one considers that most of the evidence furnished by the Morgan school deals with insignificant characters or with defects. Anatomic nomenclature is a matter of no significance in the author's estimation. He seems to think that most Greek and Latin plurals end in i. His use of terms such as perilymph and choroid plexus is astonishing, to say the least. The author's ignorance of the adult structure and relation of the organs which he is following through ontogeny is reflected by various errors. Thus on page 301: "Since there is no body cavity in the neck or tail regions it is obvious why the sympathetic chains are lacking there." The ependyma is said to be differentiated as a distinct layer from neural fold stages on. The optic nerve fibers grow centrally, he says, "through the choroid fissure." On page 240 he writes as follows: "The brain progressively becomes relatively smaller in its development to the adult condition by pushing the successive divisions of the brain closer together, a process known as cephalization." The concept of differential growth never occurred to the author. He keeps harping on exceptions to the biogenetic law, failing to realize that most reminiscences of past racial history might have dropped out of vertebrate ontogeny as completely as they did from cephalopod development. The really significant thing is that there are recapitulations like the gill pouches and aortic arches in amniotes. The majority of human implantation sites selected for presentation were either abnormal or poorly preserved. The macerated Peters specimen is described as "probably the best preserved . . . of all human embryos"!

Oral Pathology: A Histological, Roentgenological, and Clinical Study of the Diseases of the Teeth, Jaws, and Mouth. By Kurt H. Thoma, D.M.D., Professor of Oral Surgery, Harvard University, Boston. Cloth. Price, $15. Pp. 1,306, with 1,370 illustrations. St. Louis: C. V. Mosby Company, 1941.

This is a comprehensive coverage of oral pathology, easily the best in this field. It can be recommended without material reservation to both students and practitioners interested in and concerned with diseases of the mouth. The material presented by the author is inclusive without being unduly redundant. The longest chapters, about eighty pages each, deal respectively with modifications of growth and development, dental caries and tumors of the soft tissues. Each chapter is followed by a bibliography including liberal selection of pertinent articles from the literature, over two thousand in all; possibly there are too many, as there is little indication as to the relative value of the items cited. The illustrations are well selected from a wide range of material and add immeasurably to the value of the text. More than one third of these are reproduced from the work of other writers, but with their permission and due acknowledgment. The quality of these illustrations is generally high, although there is a wide margin between the best and the poorest. One objective of the author, to present adequately the evidence "that the tongue and oral mucosa constitute a barometer, a mirror which reflects the state of health of the patient," has been definitely attained. In no other place in the literature will such descriptions be found in such abundance. This includes not only disease in general but also especially blood dyscrasias, food deficiencies and diseases of the skin. Hereditary anomalies of the teeth and oral structures receive generous attention, including case histories and genealogical charts. All of this is done without any neglect of the usual subject matter of oral infections, tumors, dental caries or pyorrhea. There is an adequate index.

William Henry Welch and the Heroic Age of American Medicine. By Simon Flexner and James Thomas Flexner. Cloth. Price, $3.75. Pp. 539, with 26 illustrations. New York: Viking Press, 1941.

Here is a volume that has long been awaited by the medical profession, since it recapitulates the story of a great leader in the advancement of medical science and since the story is told by a distinguished pupil. Perhaps a single authorship would have made this a better book than it is, because its one failing seems to be the unevenness of the various chapters in their treatment of their subjects. Thus some of the chapters are highly scientific and profuse with technical terms; others have the same charming simplicity that characterized the book by James Flexner called "Doctors on Horseback." If there is any other fault of the volume it lies in its failure to recognize the human attributes of Dr. Welch which made it quite possible for him occasionally to fail in his objectives and which made it also possible that he might occasionally pursue an objective to a successful result without being willing to concede the dangers or the harm that might result from such a success. No doubt the passing of time will make possible a much more

scientific evaluation of Dr. Welch's work. The present volume is more than satisfactory as a record of his career and as a picture of the man.

Readers will learn with surprise that Dr. Welch really did not want to be a doctor, that his early inclinations were wholly toward education and the classics. Nevertheless he was descended from a line of physicians, and his decision to engage in medicine as a career met with the prompt approval of his family. His early education was supplemented by study abroad with men whose names are today associated with the fundamental studies that laid the ground for our modern knowledge of pathology and bacteriology. The mind of Dr. Welch was alert, full of curiosity, and was a scientific mind. Hence he sifted well from the vast diet that was laid before him. Nevertheless, just as Sir William Osler failed to recognize the great significance of the contributions of Pasteur, so also the great Welch seems to have failed to participate in the presentations of Robert Koch and spent his time in other studies which seemed to interest him more.

American leaders will want to read this book for its story of the beginning of the Johns Hopkins Hospital, for the innumerable contacts of William Welch with the great philanthropists who by their gifts probably did as much to force certain trends in American medicine as did the medical leaders who guided those trends. They will find great interest in the travels of Dr. Welch, and they will enjoy the inside story of the establishment of the Institute for the History of Medicine at Johns Hopkins University School of Medicine. The personality of Welch is revealed as that of a man whom many called "Popsy" behind his back but who knew him only as Dr. Welch in his official life. They will find that he was withal a lonesome man, whose influence and work still continue and have made a permanent record in American medical life. One finds that he was a great leader in the campaign against antivivisection. One would find the account more balanced if there were adequate mention of the part played by W. W. Keen in this work. One finds him credited for having established the first scientific medical journal in the United States; yet this seems hardly to recognize other contributions which were certainly in the field at the time when the *Journal of Experimental Medicine* was established. The preparation of this book undoubtedly included much research, and there is a long list of acknowledgments. There is also appended a record of the organizations with which Dr. Welch was associated, and the honors bestowed on him. There are many pages of notes documenting some of the statements made in the text, and there is an excellent index. The book stands in favorable comparison with the autobiographies and biographies which have during this year recorded for us the lives of the great faculty which made Johns Hopkins University School of Medicine the leading medical school for a considerable period in our country.

Modern Trends in Ophthalmology. Edited by Frederick Ridley and Arnold Sorsby. By J. Adamson et al. Cloth. Price, $10. Pp. 699, with 271 illustrations. New York: Paul B. Hoeber, Inc., 1940.

This book is a compilation of material supplied by fifty-five different authors. Its purpose can best be described by quoting the editors' statements in the preface: "Clinical practice occupies a position in between the systematized knowledge (and some venerable fallacies) enshrined in textbooks, and the ferment found in the periodical literature. . . . Throughout the book it has been our aim to emphasize neither that which is already established, nor that which is as yet unformed, but to indicate emergent tendencies and formative influences." In accomplishing their purpose the editors have divided the material into seven sections: ophthalmology in relation to general medicine, diagnostic procedures, refraction and binocular vision, physiology of vision, some newer conceptions in pathology, treatment and social aspects. The editors have planned their book with foresight, and the contributors include many of the foremost ophthalmologists of our day writing on phases of the subject in which each is renowned. On the whole it can be said that the authors have succeeded admirably in fulfilling the aims which they have expressed. As inevitably must happen in a work of this type, certain of the chapters leave something to be desired while others are superb in their discussion of the material. Especially well handled are the chapters on allergy and immunity in ophthalmology by Alan C. Woods, retinal and choroidal arteriosclerosis by Jonas Friedenwald, the intraocular pressure by Frederick Ridley, and hereditary and constitutional dystrophies of the cornea by Franceschetti and Streiff. This book is one which practicing ophthalmologists will find interesting but which beginners will hardly appreciate.

Psychogenic Factors in Bronchial Asthma. Part I. By Thomas M. French, M.D., and Franz Alexander, M.D. With the Collaboration of Catherine L. Bacon, M.D., et al. Psychosomatic Medicine Monograph IV. Paper. Price, $2. Pp. 92. Washington, D. C.: National Research Council, 1941.

As quickly as the word was introduced into American medical circles, "psychosomatic" was given much lip service by many physicians and psychologists. Psychosomatic as applied to factors in a given case, as a branch of medicine or as a special type of research, is horribly misused and all too frequently misunderstood. This monograph on bronchial asthma may stand as a documentary definition of what is meant by psychosomatic, for it is a living model of investigation in that field.

The Chicago Institute for Psychoanalysis is exceptionally fortunate in its capacity for psychosomatic research. It commands a large clinical material on which the many cooperating analysts work, it enjoys adequate medical consultations and its directors have the vision with which to sift from the large quantities of superficial data presented at innumerable seminars by collaborators (twelve for this study) the specific psychologic factors in etiology. Yet organic factors are not overlooked or neglected. As French states, ". . . on the other hand there seems to be fairly general agreement among allergists that psychological and allergic factors may easily stand in a supplementary relationship to each other. In many cases at least it is not a question of either an allergic or a psychological etiology but of some sort of cooperation between them."

Concerning the psychologic component in the etiology, asthmatic attacks tend to be precipitated by situations that threaten to separate the patient from some mother figure, and in such a situation the asthma attack seems to have the significance of a suppressed cry. Such suppression is often the result of early demands for attitudes of independence and self sufficiency in childhood before the patient had developed such capacities. Many of the mothers were of the rejecting type. Situations which presented direct or indirect temptations toward independence evoked asthmatic attacks.

Although the number of adults and children studied in this research was quite large, the psychodynamic studies summarized are now open to statistical proof. Such fresh studies of large quantities of patients, of necessity studied superficially, must however be dynamically oriented and penetrate beneath the apparent realities of the actual precipitating factors. Many seemingly diverse situations may have in common temptation factors. It may be possible to institute short psychotherapy with good results based on a knowledge of these psychodynamics.

Internists and psychiatrists are strongly urged to study this monograph, for in the reviewer's opinion it represents a major contribution to psychosomatic research and therapy.

The Principal Nervous Pathways: Neurological Charts and Schemas with Explanatory Notes. By Andrew Theodore Rasmussen, Ph.D., Professor of Neurology, Department of Anatomy, University of Minnesota Medical School, Minneapolis, Minn. Second edition. Cloth. Price, $2.50. Pp. 73, with 28 illustrations. New York: Macmillan Company, 1941.

Professor Rasmussen's splendid atlas is presented in a revised edition. Certain alterations in the localization of sensory tracts have been based on newer knowledge from surgical operations on human beings. The section on the diencephalon has also been revised. The drawings have been made with meticulous care and deserve thorough study. The book is highly recommended for students and specialists.

Psychiatry as a Career. Published by The Institute for Research, Chicago. The Institute for Research, Research No. 116. Paper. Price, $1. No pagination, with illustrations. Chicago, 1941.

This little brochure is part of a series of articles written to answer questions of young men who are about to choose their careers. The material is written in easily understandable style, and the contents represent a fair and adequate statement of the psychiatrist's functions. It can be recommended to college students who show a beginning curiosity regarding psychiatry.

Queries and Minor Notes

THE ANSWERS HERE PUBLISHED HAVE BEEN PREPARED BY COMPETENT AUTHORITIES. THEY DO NOT, HOWEVER, REPRESENT THE OPINIONS OF ANY OFFICIAL BODIES UNLESS SPECIFICALLY STATED IN THE REPLY. ANONYMOUS COMMUNICATIONS AND QUERIES ON POSTAL CARDS WILL NOT BE NOTICED. EVERY LETTER MUST CONTAIN THE WRITER'S NAME AND ADDRESS, BUT THESE WILL BE OMITTED ON REQUEST.

LOSS OF HEARING FROM DYNAMITE BLAST

To the Editor:—A gold miner was working in a raise with a stoping machine when dynamite was blasted from a place about 100 feet below and 20 feet away from the place where he was. The man suddenly felt dizzy and noticed he could not hear anything. He was treated at the company hospital, and after a few days hearing returned to one ear, but the other ear remained deaf six months afterward. This is a labor compensation case. Can the deafness be attributed to the blasting at the distance mentioned? What is the prognosis with regard to the return of hearing in the deaf ear?

Jose S. Santillan, M.D., Manila, P.I.

ANSWER.—Loss of hearing from an explosion may be due to rupture of the drum membrane, in which case the loss is not complete and recovery occurs as the drum membrane heals, or it may be due to trauma to the end organ of hearing in the labyrinth as a result of the sudden loud noise, in which case the hearing may be completely lost, but more often the impairment involves only part of the tone range and in the ensuing weeks there is generally partial recovery.

Complete and persistent loss of hearing following exposure to an explosion may occur in soldiers under shell fire on a functional basis (hysterical deafness).

In the case of the gold miner a complete examination of the ear and hearing with appropriate tests (Weber, Rinne, Schwabach and audiometer tests) to demonstrate the location of the lesion and the Stenger test to detect malingering should show which type of lesion this patient has suffered. The fact that the hearing has returned in one ear but not in the other speaks for an organic rather than a functional defect. After six months further improvement in an organic defect would not ordinarily be expected to occur. Whether damage to the ears could occur at the distance mentioned depends on the intensity of the blast. If workers are usually exposed to this sort of blasting at the distance stated without damage to the ears it would seem unlikely that the blast caused the deafness. There is, however, considerable individual variation in the susceptibility of the ear to acoustic trauma.

ONYCHIA AND DERMATITIS IN WORKER WITH CLEANING FLUIDS

To the Editor:—A man aged 28 has onychia. His occupation is that of a cleaner. This condition is most severe on both thumbs, and there is a rash on the thenar eminence of the left hand. The rash resembles eczema. There is no evidence of any disorder in the nervous system or infection or presence of foreign bodies. The Wassermann reaction is negative, and the patient appears to be in sound health. I have used the ordinary treatment for eczema with no results. I was formerly of the opinion that this irritation might be due to the solvent, made by the Du Pont Company, used in the cleaning business. The patient did not permit his hands to come in contact with this solvent for some time, and decided improvement was present. However, he continued to work in his place of business, and I was in doubt as to whether the inhalation of these fumes was sufficient to keep the inflammatory process active. I would appreciate your opinion and any suggestions as to further treatment.

L. H. Dunham, M.D., Scottsbluff, Neb.

ANSWER.—Both the dermatitis and the onychia may be the result of such occupational contact with a chemical solvent. It is not believed that a condition of this type could result from inhalation of fumes. It is most likely that the solvent, following repeated contact with the skin, has produced a dermatitis. Such dermatitis usually develops as a dermatitis venenata or simple contact dermatitis and becomes eczematized through repeated recurrence or chronicity. Solvents usually act as irritants both by removing the protective coating of natural oil and superficial epidermal cells, following which the skin is more vulnerable to all types of irritation including that caused by soap and water, or the solvent acts as a direct chemical irritant as a result of penetrating the pores or the epidermis itself. In chronic dermatitis of this type, onychia or nail changes of a dystrophic type frequently develop as a result of disturbance of nutrition of the growing nail at its matrix because of the dermatitis in the region of the nail. The observation that the condition improved following avoidance of contact with the solvent supports a diagnosis of occupational dermatitis and onychia. The possibility of onychomycosis or fungous infection of the nail must also be considered, though the latter condition is not commonly observed and is usually associated with evidences of fungous infection elsewhere, particularly on the toes and involving the toenails.

When all the nails or the majority of the nails are involved, consideration must be given to possible constitutional or nutritional disturbances; but if the involved nails are only those on the thumbs or fingers that also exhibit dermatitis, then occupational dermatitis is more likely to be the cause.

The first and most important procedure in treatment is, of course, removal from contact with the irritant by change of work. If this cannot be carried out, protective measures should be followed whenever exposure to the solvent occurs, such as the wearing of rubber gloves or finger cots or bland protective creams and bandages. In the treatment of the dermatitis itself, when the condition is the result of an occupational irritant, bland creams are best, and where the solvent may have dried the skin excessively an ointment containing hydrous wool fat is usually desirable. It is not probable that the onychia will be responsive to treatment, but once the dermatitis has been healed normal nail growth is likely to occur. In a chronic phase of dermatitis, weak tar preparations in ointment form are likely to be helpful and, in dermatologic practice, small doses of unfiltered roentgen rays are frequently helpful but must be used cautiously to avoid permanent damage to the nail matrix.

ERGONOVINE IN LABOR

To the Editor:—Will you please give me information on the use of ergonovine intravenously at the end of the second stage of labor to prevent blood loss?

J. B. Carlyle, M.D., Burlington, N. C.

ANSWER.—Ergonovine is a powerful uterine stimulant and is rapid in action. It has been administered orally, intramuscularly and intravenously. The pharmacology of this drug has been investigated and a review may be found in the medical literature. About three years ago M. E. Davis and his associates at the Chicago Lying-in Hospital instituted, as an experimental procedure, the use of ergonovine administered intravenously at the end of the second stage. Davis suggested the following technic: When the baby's head has been delivered and the anterior shoulder has been brought into view, 0.2 mg. of ergonovine is given intravenously. Twenty or thirty seconds are allowed to elapse for the drug to take effect and then the baby is delivered. With the evacuation of the uterine cavity and under the influence of this powerful oxytocic, the uterus contracts down quickly, thereby separating the placenta from its attachment. At the same time the placenta is usually pushed out of the upper segment into the distended lower segment and vagina.

According to Davis (Postpartum Hemorrhage, *Am. J. Surg.* **48**:154 [April] 1940) the intravenous use of ergonovine produces complete separation in most instances because of the effectiveness of the contraction of the uterine musculature. The sudden reduction of the placental area shears the placenta from the uterine wall during the initial contraction; the blood loss is thus reduced, and the incidence of third stage complications has been said to be greatly decreased. Rarely the separated placenta will be caught in a contraction zone at the junction between the upper and lower segments, and manual removal may have to be resorted to. This drug should be administered only in a hospital, as an assistant is needed to give the drug so that the obstetrician may devote his entire attention to the uterus and extraction of the placenta.

In some experimental animals ergonovine has been shown to be approximately one-fourth as toxic as ergotoxine and ergotamine. Although gangrene can be produced experimentally, no clinical reports have appeared describing the occurrence of gangrene in human beings following the use of ergonovine. Toxic symptoms closely resemble those produced by the older alkaloids of the ergot series.

PROGNOSIS IN CARCINOMA OF RECTUM

To the Editor:—I have made a diagnosis of primary adenocarcinoma of the rectum. The mass is at the rectosigmoidal junction. The patient was roentgenographed for every available part to which carcinomatous tissue commonly infiltrates; for example, the long bones of the body, the lungs, the stomach, the liver, the urinary bladder and the kidneys. The carcinomatous mass has been removed in toto. What would be the prognosis in such a case?

John B. Bellucci, M.D., Chicago.

ANSWER.—Statements as to prognosis in a case of primary adenocarcinoma of the rectum are difficult. In general, the prognosis depends on the age of the patient, the duration of symptoms, the size of the growth itself, the histologic type and whether or not spread has occurred to the regional lymphatics.

Papillary tumors have a better prognosis than infiltrating ones. Where the neoplasm has not extended through the muscular wall of the bowel, the prognosis is much better than when invasion through the serosa has occurred. Wide resection affords a greater chance for prolonged survival than more limited excisions. Recorded experience over the past several decades indicates clearly that improved methods of excision have afforded an ever increasing incidence of prolonged survival. Statistics for prolonged survival following apparently complete excision of rectal carcinomas vary considerably, the best being anywhere from 50 to 60 per cent of those surviving the operation. In series of unselected cases the five year survival is variously stated as 25 to 30 per cent of those surviving the operation. It would seem that the latter figure is conservative and might well represent the true situation with regard to these cases in general. The failure to recognize by clinical and roentgenographic examination evidences of metastases during the period shortly following operation would be of little significance in affording a prognosis, since satisfactory recovery from these operations and a period of apparent freedom from disease are only too often followed by development of metastases. Any patient surviving five years or more from resection of a primary adenocarcinoma of the rectum would appear to have an excellent chance for permanent "cure," unlike some other types of neoplasms in which five year survival does not necessarily indicate that recurrence or latent metastases may not subsequently manifest themselves.

MOTTLED ENAMEL FROM FLUORIDES

To the Editor:—**What can be done to restore fluoride mottled teeth to normal whiteness? Is it possible to grind the surfaces of such teeth and cement porcelain caps over them? If such a procedure is possible, is it injurious to the teeth? What unfavorable complications might follow a properly performed operation of this type? If this work is is done, where can I obtain a list of those competent to do it?**

M.D., Texas.

ANSWER.—Because mottled enamel (endemic dental fluorosis) is a developmental enamel hypoplasia and because dental enamel is incapable of self repair during its posteruptive life, one should not expect even with the best known therapy that the enamel will be restored to normal translucency. A method of removing the brown stain from mottled enamel teeth, using a hydrogen peroxide-ether solution, has been described by Ames (*J. Am. Dent. A. & Dental Cosmos* **24**:1674 [Oct.] 1937), which is reported to ameliorate this distressing condition considerably.

It is, of course, possible to remove the enamel and prepare the tooth for the reception of a porcelain jacket crown. An operation of this type for a tooth affected by mottled enamel should not involve any greater liability to the occasional pulpal devitalization or the recession of the gums than might follow in the case of a tooth not affected by mottled enamel. The preparation of a tooth for and the placement thereon of a porcelain jacket crown is routine practice for any well trained dentist.

In cases of even severe brown stain it would seem advisable to try first the brown stain removal therapy before recourse is had to the more radical porcelain jacket procedure. The attempt to remove the brown stain by grinding off the outer enamel surface followed by polishing or the inexcusable use of acid preparations in an attempt to remove brown stains are to be avoided because of the frequence of postoperative sensitivity to thermal changes.

It is not possible to furnish a list of those competent to remove brown stain from mottled enamel teeth, but it is thought that an inquiry to the dental society officials at either Amarillo or Lubbock (Texas) communities severely affected by mottled enamel might disclose the names of local practitioners experienced in this particular technic.

URETHRAL CARUNCLE

To the Editor:—**What is the treatment for urethral caruncle?**

M.D., Wyoming.

ANSWER.—The first step in the treatment of urethral caruncle is accurate diagnosis. Prolapse of the mucosa of the external meatus of the urethra frequently is erroneously regarded as a caruncle. Excision or cauterization of the prolapsed mucosa usually is followed by an eroded area, which often causes considerable distress and irritation. A caruncle usually can be demonstrated by the presence of a pedicle.

The best method of treatment of a caruncle is to clamp its pedicle with a fine, flat clamp applied as close to the urethral mucosa as possible. The protruding portion of the caruncle is then snipped off with scissors. Cauterization can best be accomplished by applying a standard solution of acid nitrate of mercury to the basal tissues in the clamp. Care should be taken that the solution does not come in contact with the surrounding mucosa.

Incidentally, it should be remembered that many caruncles do not cause any symptoms and, if small, are frequently best left alone.

MONILIASIS AND VITAMIN DEFICIENCY

To the Editor:—**Can you tell me of any work that has been published on the problem of producing a relative deficiency of one group of vitamins by overdosing of another group? What is known about overdosing in relation to any of the vitamins? A patient who manifested no obvious deficiency symptoms had taken thiamine hydrochloride 3 mg. a day for a year. She then started taking B complex 6 capsules a day, each capsule containing 333 international units of B_1, 500 micrograms of riboflavin, 130 micrograms of B_6, 10 mg. of nicotinic acid and 14 Jukes-Lepkovsky units filtrate factor. After about a month of this dosage the patient contracted a moniliasis of the mouth. I have wondered whether this infection may represent a deficiency of one of the other vitamins.**

M.D., New York.

ANSWER.—It is not certain that moniliasis is a true manifestation of specific deficiency disease, although it is evident that in many people with B complex deficiencies various organisms of this type grow within the alimentary canal or in the mouth. In all probability they are secondary invaders.

There is indirect evidence that imbalance in medication with various B complex factors may lead to difficulties of one kind or another. The mechanism of this is not clear and it has not been shown that overadministration of one B complex factor produces a deficiency of another. However, there are two reported cases in the literature of pellagra developing after exclusive vitamin B_1 therapy (Braendstrup, Poul: Pellagra Developing During Exclusive B_1 Therapy, *Ugesk. f. læger* **102**:95 [Jan. 25] 1940. Salvesen, Olaf: *Nord. med.* **5**:297 [Feb. 17] 1940), but it cannot be assumed that in these cases pellagra would not have developed even if no thiamine had been administered. It is well known that evidence of thiamine deficiency may develop in patients with endemic pellagra during treatment with nicotinic acid if the diet is not improved or other B complex factors are not administered (Aring, C. D.; Evans, J. P., and Spies, T. D.: Some Clinical Neurologic Aspects of Vitamin B Deficiencies, THE JOURNAL, Dec. 9, 1939, p. 2105). There is a discussion of this problem in the 1941 Annual Review of Biochemistry (Morgan, A. F.: Annual Review of Biochemistry, 1941).

RECURRENT MYXOSARCOMA

To the Editor:—**Two years ago a retroperitoneal myxosarcoma was removed from a woman in her early thirties. Its size was approximately 3 by 4 by 6 inches. It has now recurred, and its present size is again approximately the same. Can you advise me as to the prognosis and proper treatment? Is the roentgen ray used either as a complete treatment or postoperatively?**

M.D., Minnesota.

ANSWER.—The prognosis and treatment depend on clinical and microscopic information that is not available in the data submitted. Roentgen therapy is used as a postoperative measure in operable lesions and as the sole treatment when the lesion is inoperable (Ewing, James: Neoplastic Diseases: A Treatise on Tumors, Philadelphia and London, W. B. Saunders Company, 1940).

ALLERGY TO SPERMATOZOA NOT PROVED CAUSE OF STERILITY

To the Editor:—**Could a wife be allergic to her husband's sperm and could this be a cause of sterility? If this should be true is there any method of determining it? Is there any treatment (desensitization)? The young woman in question has had all types of tests and all give normal results. The oviducts are patent, the uterus is normal in size and the menstrual history normal, twenty-eight days, three to five day type with no dysmenorrhea. The husband's spermatozoa are highly motile and abundant in number. There is no history of contraceptives or acid douches being used. Could my opening question be a factor in the cause of sterility in such a case? If so, what can be done? Any suggestion would be appreciated.**

M.D., Michigan.

ANSWER.—There is no sound evidence that a woman can become allergic to the spermatozoa of her husband. For many years animal experiments have been carried out in which the fertility was reduced or complete infertility established by the long continued parenteral injection of homologous semen. More recently, however, Eastman, Guttmacher and Stewart concluded, after a series of animal studies, that the injection of semen slightly reduced the fertility of the recipients but that the reduction was without practical importance.

Possibly some unknown factor is responsible for the infertility of this couple. Basal metabolic determinations on the husband and wife may warrant the use of thyroid. If air or gas was

used in establishing the patency of the oviducts, this procedure can be repeated after an interval of at least a year, using iodized oil. This will afford the opportunity to visualize the reproductive tract and furthermore it may enhance the possibility of gestation. When all the factors which tend to decrease fertility have been removed, gestation will probably result.

PURPURA

To the Editor:—A woman aged 38 in good health, with no evidence of the menopause as yet, has ecchymotic spots on various parts of her body at intervals of a few days. The first thing she notices is the onset of a sudden sharp, stinging pain, and in a few minutes a small swelling appears in this site, usually about ⅛ to ¼ inch in diameter and slightly raised. A few minutes or hours later she notices a small black-blue area in the location where the swelling took place. These spots look like a small bruised area without tenderness. The lesions have appeared in various parts, but mostly on the arms or legs. In three or four days the discoloration disappears completely. I am at a loss to explain these lesions unless they are due to a sudden rupture of a small capillary, and if this is the case what would provoke such a condition? What can be done to prevent them? Is the condition serious and might such a condition occur in the brain? These spots occur one at a time, and never are there more than two in a period of a week or more.

M.D., Kansas.

ANSWER.—The lesions described are those of purpura. Since purpura is only a syndrome, it is necessary to obtain further data before the etiology can be established. A complete blood examination, including a platelet count, is essential. The prognosis and treatment depend on the cause.

If thrombocytopenia is present, it is important to determine whether it is primary or secondary in type. Among the more common causes of secondary thrombocytopenic purpura are leukemia, metastatic disease of the bone marrow and toxic depression of the marrow, as in aplastic anemias.

If the platelets are normal, the purpura may be idiopathic or secondary to various toxic conditions. Bleeding in the urine and stool may presage hemorrhages into the brain. Frequently, however, this condition is not progressive. Treatment is not highly satisfactory. Occasionally an allergic basis is present, foci of infection should be looked for, and finally some cases respond to endocrine therapy. In some cases, especially in women, the superficial veins appear to be unusually fragile, causing a harmless variety of purpura.

HALITOSIS FROM MAXILLARY SINUSITIS

To the Editor:—I have had repeated attacks of bad breath for many years. I had my tonsils removed some years ago, with some improvement. Lately, however, these attacks have seemed more frequent than usual. I have had constant sinus drainage that I know about since 1928. It is purulent in type, and to judge from roentgenograms and observable drainage it is confined largely to the left maxillary sinus. I have no symptoms other than drainage; there are no headaches and no pressure pain over the sinus area. Is such drainage sufficient to cause bad breath? Can you recommend measures to cure such a condition that offer more assurance of cure than just repeated operation for adequate drainage? Drainage seems profuse through the nose all the time, although I am aware that that does not drain the bottom of the sinus area.

M.D., Texas.

ANSWER.—It must be assumed that the diagnosis of chronic maxillary sinusitis on the left side is established. The purulent secretion present at all times can be responsible for repeated attacks of bad breath. This does not mean that a search should not be made for other causes.

Operative intervention properly carried out will give a satisfactory result in a large number of cases. Such intervention in the nature of a Caldwell-Luc operation is, as a rule, successful in the first instance. The object of the operation is not only to supply adequate drainage but to remove as far as possible all diseased mucous membrane. In only a small percentage of cases is it necessary to reoperate.

CHOCOLATE AND LEAD

To the Editor:—Several times I have heard patients comment on the fact that there is lead in commercial chocolate, and they have asked me whether or not it is true and whether or not there is sufficient lead to be harmful. Apparently this has come from Consumers Research or some such organization.

H. L. Mawdsley, M.D., San Mateo, Calif.

ANSWER.—Some years ago there was considerable discussion as to the amount of lead which can be obtained from eating chocolate. Small quantities can be found just as can be found in other foodstuffs, but as a result of this agitation chocolate manufacturers took great pains to eliminate any lead from their product as well as from the wrappers on the chocolate. It would appear safe to say that chocolate is as free as other foods from lead. Any processed food may have small quantities of lead, either from the natural content of lead in the food or from small contaminations in the process of manufacturing, but these extremely minute quantities have never been shown to produce any deleterious effects in animals or in man.

PROGNOSIS AFTER CHOLECYSTOGASTROSTOMY IN INFANT

To the Editor:—An infant of 2½ months was operated on for obstructive jaundice at 3 weeks of age. An atresia of the bile ducts was present. A small gallbladder with clear bile was found, and a cholecystogastrostomy was done. A small amount of bile has been coming through the stool since. The icteric index has come down from 320 to 115. What is the usual course and prognosis in such a case? Should bile salts be given, and if so how much and what kind? Is any other medication or diet indicated?

M.D., New York.

ANSWER.—The presence of bile in the stools and decrease in the icteric index is definite evidence that the obstructive jaundice has been relieved. In all probability the condition will continue to improve with the growth of the child and in a few months should be entirely cleared up. There is, of course, the possibility that narrowing of the fistulous tract may come on, but this is not the usual course in these cases. If it does occur it can probably be relieved by secondary operation.

In the meantime it may be advisable to administer bile salts and an acceptable vitamin K preparation once a day until the jaundice has disappeared.

DENTAL EXTRACTIONS AFTER CORONARY OCCLUSION

To the Editor:—A man aged 57 was operated on two years ago for suppurative mastoiditis. At that time it was found that he had many chronically abscessed teeth and myocardial damage. On complete recovery from the mastoid involvement it was urged that he have proper dental care, which was done in a rather indifferent manner on his part. Two weeks after the extraction of a tooth a coronary occlusion followed. Please advise me as to how soon it could be considered safe to entertain the idea of removing the remainder of the abscessed teeth? The occlusion took place three weeks ago, apparently the posterior group. Progress toward recovery has to date been satisfactory.

M.D., Virginia.

ANSWER.—It seems probable that the coronary occlusion was not associated with extraction of the teeth. The problem at the present time is to permit the complete recovery of the patient from coronary occlusion, and further extraction of the teeth should not be planned until there is no longer evidence of coronary change. Usually recovery sufficient for necessary extractions would occur in three to six months. In future extractions epinephrine in local anesthesia is to be avoided.

HAZARD OF TUBERCULOSIS IN SOUTHWEST

To the Editor:—A boy aged 11½ years during damp, cold weather, suffers from fleeting migratory neuralgic pains. This began two and one-half years ago. There is no evidence of rheumatic fever. His general condition is good. An ethmoiditis is present. He has been in Florida for the winter. I should like to take him to an area of low humidity, such as Tucson or Phoenix, Ariz., or Palm Springs, Calif. As there are supposed to be many cases of tuberculosis in these Arizona cities, would there be any danger in living there? Are latent or healed cases allowed in the public schools and, if so, would contact be dangerous? Or would you advise Palm Springs, Calif., which is also located in an arid area?

Irving Friedman, M.D., Peekskill, N. Y.

ANSWER.—There would be no danger in having an 11½ year old boy live in Tucson, Ariz. His exposure to tuberculosis contact in the public school systems of Arizona would be no higher than it is in Peekskill, N. Y.

PILONIDAL CYST

To the Editor:—In the October 18 issue of *The Journal*, p. 1404, there appeared a question entitled Pilonidal Cyst. The case cited concerns a recurrence of this lesion. Please permit me to call your attention to radiation therapy as an effective form of treatment for recurrent pilonidal cysts and sinuses (Turell, Robert: Radiation Therapy for Recurrent Sacrococcygeal Cysts and Sinuses, *Surgery* 8: 469 [Sept.] 1940). I have reported 4 cases of recurrent pilonidal sinuses that responded to therapy in doses of 600 to 900 roentgens. More recently, however, a larger dose of 1,200 to 2,100 roentgens has occasionally been employed. In the original paper I said "It is conceivable that, when all branches of the sinus or ectopic epithelium are incompletely removed during the original operation, radiation therapy may fail, and reoperation may become necessary." Radiation therapy was suggested mainly on the proposition that recurrence after operation is due primarily to incomplete extirpation of infected tissues. I feel that this form of therapy, based on subsequent personal experience and on that of several colleagues specializing in radiation therapy, is an effective substitute for operation for recurrence of infected pilonidal (sacrococcygeal) sinus. Reoperation, however, is indicated in cases in which branches of the cyst or sinus or ectopic epithelium were incompletely removed at the original operation.

Robert Turell, M.D., New York.